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Contact Information

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- **Editorial Office:** editor@imcra-az.org
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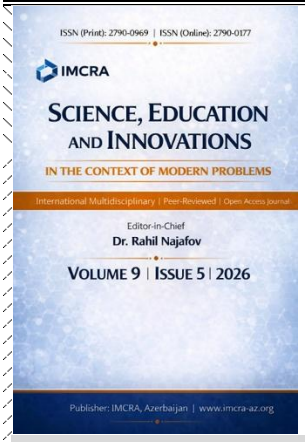
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RESEARCH ARTICLE

An Integrative Multidimensional Analysis of the Factors Influencing the Formation and Development of Creativity: Cognitive, Motivational, Socio-Cultural, and Educational Perspectives

Nigar Eldar Zeynalova
PhD in Pedagogy, Associate Professor
Department of Pedagogy, Azerbaijan University of Languages
Azerbaijan
Email: nigarzeynalova777@gmail.com; https://orcid.org/0000-0002-5107-8540

Keywords creativity, intrinsic motivation, divergent thinking, talent, cognitive processes, educational innovation, socio-cultural factors

Abstract

Creativity has emerged as a central construct in contemporary scientific discourse, playing a critical role in education, innovation, and socio-economic development. Despite extensive interdisciplinary research, the nature, structure, and determinants of creativity remain complex and insufficiently defined. This study aims to provide a comprehensive and integrative analysis of the factors influencing the formation and development of creativity, drawing upon theoretical frameworks from psychology, pedagogy, philosophy, and socio-economic studies. The research systematically examines major theoretical approaches to creativity, including cognitive models emphasizing divergent thinking, humanistic perspectives highlighting intrinsic motivation and self-actualization, and systemic frameworks that consider the interaction between individual, environment, and cultural context. Particular attention is given to the relationship between creativity and intelligence, as well as the distinction between creativity and talent. The study also explores the role of domain-specific expertise, creative thinking skills, and environmental conditions in shaping creative performance. Furthermore, the paper analyzes classical and contemporary theories, including the componential model of creativity, the investment theory, and the systems model, providing a synthesized perspective on the multidimensional nature of creativity. The findings indicate that creativity cannot be reduced to a single factor but emerges from the dynamic interaction of cognitive abilities, intrinsic motivation, accumulated knowledge, and socio-cultural influences. The study contributes to the existing literature by offering an integrative conceptual framework that combines philosophical, psychological, and socio-economic perspectives. It emphasizes the importance of fostering creativity through supportive educational environments, flexible thinking strategies, and policies that promote openness, innovation, and tolerance. The results have significant implications for educational practice, organizational development, and innovation policy, highlighting the need for interdisciplinary approaches to understanding and enhancing creative potential.

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1. Introduction

Despite extensive research across multiple disciplines, the concept of creativity remains complex and not fully defined. Historically, creativity has been most actively studied within the domains of psychology and the arts; however, its relevance has significantly expanded to include education, science, business, and technological innovation. In contemporary society, creativity is increasingly recognized as a critical competence for addressing global challenges, fostering innovation, and promoting sustainable development.

Nevertheless, the essence of creativity continues to be debated. Scholars differ in their interpretations of its nature, origins, and mechanisms. This ongoing ambiguity highlights the necessity of further analytical exploration of the factors that contribute to the formation and development of creativity.

Literature Review

The concept of creativity has been extensively examined across multiple disciplines, including psychology, philosophy, education, and economics. Early philosophical interpretations viewed creativity as a divine or metaphysical force. For instance, Plato conceptualized creativity as a form of inspiration, while Aristotle approached it as a natural and systematic process governed by underlying principles (Plato, 1969). Later, Kant (1964) emphasized the role of originality and subjective cognition, arguing that creativity emerges from the interaction between imagination and reason.

In the field of psychology, significant contributions have been made toward understanding the cognitive and affective mechanisms underlying creativity. Guilford (1950) introduced the concept of divergent thinking as a core component of creative cognition, highlighting fluency, flexibility, and originality as key indicators. Building on this, Torrance (1974) developed standardized tools for measuring creative potential, thereby operationalizing creativity within educational contexts.

Humanistic psychologists such as Maslow (1968) and Rogers (1961) viewed creativity as a fundamental aspect of self-actualization and personal growth. They emphasized intrinsic motivation, autonomy, and openness to experience as essential conditions for creative expression. Similarly, Amabile (1996) proposed the componential model of creativity, identifying intrinsic motivation, domain-specific expertise, and creative thinking skills as the primary determinants of creative performance.

More recent theoretical developments have expanded the scope of creativity research. Sternberg and Lubart (1995) introduced the investment theory, which conceptualizes creativity as the ability to generate and develop novel ideas that may initially be undervalued by society. Csikszentmihalyi (1990) proposed a systems model, emphasizing the interaction between the individual, the domain, and the social field.

From a socio-economic perspective, Florida (2002) highlighted the role of creativity in economic development, arguing that cities capable of attracting creative individuals—through talent, technology, and tolerance—are more likely to achieve sustainable growth. Additionally, cultural and environmental factors have been recognized as critical influences on creativity, shaping both its expression and evaluation (Lubart, 1999).

Despite the diversity of theoretical approaches, most scholars agree that creativity is a multidimensional construct involving cognitive, motivational, and environmental components. However, no single theory fully captures its complexity, indicating the need for integrative frameworks.

2. Historical and Cultural Perspectives on Creativity

An examination of Western and Eastern perspectives reveals fundamental differences in the conceptualization of creativity.

In Western traditions, creativity has often been associated with originality, individualism, and even divine inspiration. It is frequently perceived as a unique human capacity to produce something entirely new and unprecedented. Conversely, Eastern philosophical traditions, particularly those influenced by Buddhism and Hinduism, emphasize creativity as reinterpretation, imitation, and transformation of existing knowledge.

These contrasting perspectives reflect broader cultural differences. Western societies tend to attribute success to innate ability and talent, whereas Eastern cultures often emphasize effort, discipline, and continuous learning as the primary drivers of achievement.

Such differences extend to views on intelligence as well. In Western contexts, intelligence is often regarded as a relatively stable, hereditary trait. In contrast, Eastern perspectives tend to view intelligence as malleable and shaped by environmental and educational factors.

3. Theoretical Approaches to Creativity

The scientific study of creativity has evolved over several decades, resulting in numerous theoretical models. One important contribution is the contextual theory proposed by Lubart, who argued that creativity is highly dependent on environmental and situational factors.

Rass conceptualized creativity as the interaction of three major components:

3.1 Personal Characteristics

These include traits such as:

- Independent thinking

- Openness to experience
- Tolerance for ambiguity
- Nonconformity
- Curiosity and intellectual risk-taking
- Strong intrinsic motivation

3.2 Emotional (Affective) Processes

Creative individuals often demonstrate:

- Emotional engagement with tasks
- Enjoyment of complexity and challenge
- Capacity for imaginative and affective expression
- Resilience in the face of uncertainty

3.3 Cognitive Abilities

Cognitive dimensions of creativity involve:

- Divergent thinking
- Flexibility in problem-solving
- Sensitivity to problems
- Ability to generate multiple solutions
- Broad and integrated knowledge base

These components interact dynamically, suggesting that creativity cannot be reduced to a single factor but emerges from a complex system of psychological processes.

4. The Creative Process

One of the most influential models of the creative process was proposed by Graham Wallas, who identified four sequential stages:

1. **Preparation** – identifying and analyzing the problem
2. **Incubation** – unconscious processing and idea development
3. **Illumination** – sudden insight or realization
4. **Verification** – evaluation and refinement of the idea

Although later researchers have expanded this model, its core structure remains foundational in creativity research.

Additionally, Gestalt psychologists such as Köhler and Wertheimer emphasized the importance of perception and insight in problem-solving, contributing significantly to the understanding of creative cognition.

5. Creativity and Intelligence

The relationship between creativity and intelligence has been one of the most debated topics in psychological research.

Some scholars argue that creativity is closely linked to intelligence, particularly in terms of problem-solving and analytical thinking. Others suggest that creativity represents a distinct cognitive domain characterized by divergent thinking rather than convergent reasoning.

Empirical evidence indicates that while a certain level of intelligence is necessary for creative performance, high intelligence alone does not guarantee creativity. This has led to the development of the "threshold theory," which proposes that intelligence is a prerequisite for creativity up to a certain level, beyond which other factors become more significant.

6. Creativity and Talent

Creativity is often associated with talent; however, these concepts are not identical. Talent typically refers to exceptional ability in a specific domain, whereas creativity involves the capacity to generate novel and original ideas.

Research suggests that talent may facilitate creativity, but it does not automatically result in creative output. Creative achievement requires not only ability but also motivation, persistence, and environmental support.

7. The Role of Intrinsic Motivation

Intrinsic motivation is widely regarded as one of the most critical factors influencing creativity. Individuals who engage in tasks out of genuine interest and enjoyment are more likely to exhibit creative behaviors.

Intrinsic motivation enhances:

- Cognitive flexibility
- Persistence in problem-solving
- Willingness to take risks
- Engagement with complex tasks

In contrast, excessive external pressure or reward systems may inhibit creativity by reducing autonomy and intrinsic interest.

8. Knowledge and Experience in Creativity

Weisberg emphasized the importance of domain-specific knowledge in creative achievement. According to his research, individuals must acquire substantial expertise in a given field before they can produce creative contributions.

He suggested that:

- Approximately 10 years of experience are required to achieve mastery
- An additional 10 years may be needed to produce creative innovations

This highlights the role of sustained effort, practice, and accumulated knowledge in the development of creativity. However, expertise alone does not guarantee creativity, indicating that other psychological and contextual factors must also be present.

9. Discussion

The analysis of theoretical and empirical studies demonstrates that creativity is a multidimensional construct influenced by cognitive, emotional, motivational, and environmental factors. No single theory fully explains its nature, and different approaches emphasize different aspects of the phenomenon.

The interaction between intelligence, motivation, personality traits, and cultural context plays a crucial role in shaping creative potential. Furthermore, the variability of definitions and interpretations of creativity reflects its complexity and interdisciplinary nature.

Creativity has been conceptualized differently by various scholars, reflecting its multidimensional and complex nature. Taylor (1988) described creative experience as the opposite of reproductive experience, emphasizing its originality and novelty. Esquivel (1995) defined creativity as a critical process involved in the generation of new ideas, highlighting its analytical and evaluative dimensions. Similarly, Craft (2005) characterized creativity as the ability to identify opportunities that are not immediately visible to others, thereby stressing perception and cognitive flexibility.

Runco (2007), supporting Weisberg's perspective, further emphasized that creative individuals are distinguished not only by their cognitive abilities but also by their strong work ethic, persistence, and sustained effort.

The philosophical roots of creativity have been explored extensively by scholars such as Rothenberg and Hausman, who traced its conceptual development from classical philosophers including Plato, Aristotle, Kant, and Freud. Plato considered inspiration as a central driving force behind creativity, interpreting it as a form of divine influence. Aristotle, in contrast, approached creativity from a more systematic perspective, viewing it as governed by natural laws rather than randomness. Kant introduced a critical distinction between original creation and imitation, arguing that creativity emerges from the interaction between consciousness and spontaneous mental activity. The findings of this study confirm that creativity cannot be reduced to a single explanatory factor but must be understood as a dynamic and integrative phenomenon. The interaction between intrinsic motivation, cognitive abilities, and environmental conditions plays a decisive role in shaping creative potential.

One of the most significant insights is the dominant role of intrinsic motivation. While traditional approaches often emphasized intelligence or talent, contemporary research highlights that motivation is the driving force behind creative engagement. Without intrinsic interest and personal involvement, even highly skilled individuals may fail to produce creative outcomes. This supports Amabile's (1996) argument that motivation acts as a catalyst for creativity.

The relationship between creativity and intelligence remains complex and, at times, contradictory. While a certain level of intelligence is necessary for creative thinking, it does not guarantee creativity. This suggests that creativity involves distinct cognitive processes, particularly divergent thinking, which differ from traditional measures of intelligence.

Furthermore, the role of the environment underscores the importance of social and cultural contexts in creativity. Educational systems, organizational structures, and societal values all contribute to either facilitating or constraining creative expression. Florida's (2002) model demonstrates that creativity is not only an individual attribute but also a socio-economic resource.

Another important aspect is the integration of classical philosophical perspectives with modern psychological theories. The evolution of the concept of creativity—from divine inspiration to cognitive and systemic models—reflects the increasing complexity of its understanding.

Overall, the discussion highlights the necessity of adopting a **holistic approach** to creativity, one that incorporates cognitive, emotional, motivational, and environmental dimensions.

Cognitive Foundations: Guilford's Structure of Intellect

One of the most influential contributions to creativity research was made by J. P. Guilford through his "Structure of Intellect" model. According to Guilford, creative behavior is associated with the emergence of diverse categories of thinking, particularly divergent thinking.

Guilford identified three key components of creative thinking:

- Fluency – the ability to produce a large number of ideas
- Flexibility – the ability to shift between different conceptual frameworks or perspectives
- Originality – the capacity to generate novel and uncommon ideas

These components form the core of divergent thinking. Additionally, creativity involves:

- Evaluation – sensitivity to problems and the ability to assess and refine ideas
- Convergent thinking – the ability to reorganize and integrate information

Thus, creativity is not limited to divergent thinking alone but represents a synthesis of multiple cognitive operations, including both generative and evaluative processes.

Creativity and Intelligence: Theoretical Debates

For many years, intelligence was considered a defining characteristic of creative individuals. However, the relationship between creativity and intelligence remains controversial.

Some researchers argue that a certain level of intelligence is necessary for creativity, while others emphasize that high intelligence does not automatically lead to creative achievement.

Sternberg's analysis of existing theories provides a useful classification of perspectives:

- Weisberg's view: Creativity is an extraordinary manifestation of ordinary cognitive processes; the same mechanisms underlying intelligence also support creativity.
- Guilford and Gardner's perspective: Creativity is linked to specific aspects of intelligence (e.g., divergent thinking), and in Gardner's theory of multiple intelligences, creativity is expressed through different intellectual domains.
- Erikson's position: Creativity is not an innate ability but the result of prolonged, deliberate practice within a specific domain; intelligence plays a minimal role.
- Roe's approach: Creativity and intelligence may function both jointly and independently; while both involve problem-solving, intelligence is more associated with logical reasoning.

These diverse viewpoints illustrate that creativity and intelligence are related but distinct constructs, each contributing differently to human cognitive performance.

Universality of Creativity and Psychological Foundations

Scholars such as Amabile, Robinson, and Sternberg argue that creativity is a universal human capacity, present in all individuals to varying degrees. However, the level of its development depends on both internal and external factors.

The question of whether creativity is genetically determined remains unresolved. While some evidence suggests a biological basis, most contemporary research supports the view that creativity is significantly shaped by environmental, educational, and motivational influences.

From a psychoanalytic perspective, Sigmund Freud viewed creativity as a manifestation of underlying psychological dynamics. He argued that creative expression results from internal tensions and unconscious processes that are transformed into productive outcomes.

Cultural and Environmental Context of Creativity

Laske emphasized that creativity is highly dependent on cultural and environmental contexts. According to his perspective, creativity is an axiological concept, meaning that it is value-based and cannot be objectively defined outside a specific cultural framework.

This relationship between creativity and culture can be summarized through several key arguments:

1. Creativity is context-dependent and shaped by cultural norms.
2. The value of an idea can only be assessed relative to prior knowledge and experience.
3. The environment can either stimulate or suppress creative potential.

Thus, creativity is not merely an individual trait but a socially constructed phenomenon influenced by external conditions.

Measurement and Development of Creativity

E. Torrance made a significant contribution to the operationalization and measurement of creativity. He defined creativity as a process involving:

- Sensitivity to problems
- Identification of difficulties
- Generation of hypotheses
- Testing and refinement of ideas
- Communication of results

Torrance developed widely used instruments for assessing creative potential, known as the Torrance Tests of Creative Thinking (TTCT). These tests, based on Guilford's theory of divergent thinking, evaluate individual creative abilities and are extensively applied in educational settings.

Applied Models and Creative Techniques

A. Osborn introduced a structured approach to idea generation, leading to the development of the brainstorming method, which remains one of the most widely used techniques for enhancing creativity in both educational and organizational contexts.

A. Koestler analyzed the nature of the creative process through the concept of "bisociation," suggesting that creativity arises from the intersection of previously unrelated ideas. He emphasized the importance of insight, often illustrated by the famous "Eureka!" moment associated with Archimedes.

M. Rhodes synthesized over forty definitions of creativity and proposed the well-known "4P model", which includes:

- Person – individual traits and characteristics
- Process – cognitive and emotional mechanisms
- Product – outcomes of creative activity
- Press (environment) – external influences

This model remains one of the most comprehensive frameworks for understanding creativity.

Neuroscientific and Cognitive Perspectives

Research by R. Sperry demonstrated the functional specialization of the brain hemispheres, suggesting that:

- The right hemisphere is associated with creativity and holistic thinking
- The left hemisphere is linked to logical and analytical processes

Although modern neuroscience recognizes more complex brain interactions, this distinction has contributed significantly to understanding cognitive aspects of creativity.

Edward de Bono further advanced the field by introducing the concept of lateral thinking, which involves non-linear, innovative approaches to problem-solving. He defined creativity as the production of new and valuable ideas and emphasized that creative thinking is a skill that can be developed through training.

Componential Model of Creativity

Teresa Amabile proposed one of the most influential contemporary models of creativity, known as the componential model, which includes three interrelated elements:

1. Intrinsic motivation
2. Domain-relevant skills (expertise)
3. Creative thinking skills

This model highlights that creativity emerges from the interaction of motivation, knowledge, and cognitive abilities, providing a comprehensive framework for both research and practical application.

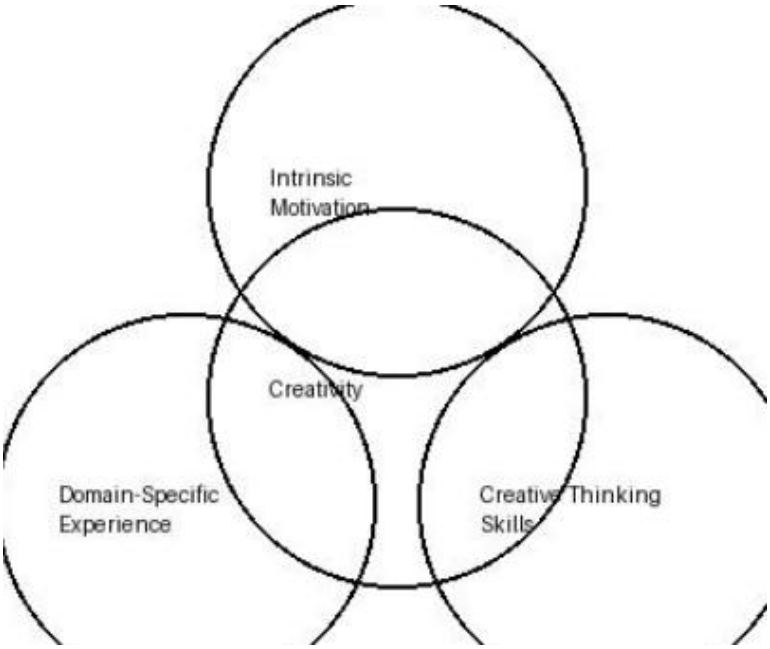

Figure 1. The componential structure of creativity illustrating the interaction between intrinsic motivation, domain-specific experience, and creative thinking skills as key determinants of creative performance.

Motivational, Cognitive, and Environmental Dimensions of Creativity

Intrinsic motivation plays a central role in the creative process, particularly in problem-solving and the generation of novel ideas. It is closely associated with an individual's internal desire to create, explore, and innovate. Domain-specific experience, on the other hand, encompasses technical, procedural, and cognitive knowledge related to a particular field, while creative thinking skills involve imagination, flexibility, unconventional thinking, and the integration of diverse ideas into new conceptual frameworks.

Amabile (1996) emphasized that among these three components—motivation, expertise, and creative thinking—intrinsic motivation is the most critical factor. When intrinsic motivation is low, even high levels of knowledge and skills may not lead to creative outcomes. External rewards, including financial incentives, are not sufficient substitutes for internal drive and engagement. This perspective aligns with Runco's (2007) assertion that creative individuals are intrinsically motivated and actively engage in tasks because they derive satisfaction from the process itself.

In later developments of her model, Amabile introduced the environmental component, recognizing that the social and organizational context can either stimulate or inhibit creativity. Thus, creativity emerges from the dynamic interaction between internal factors (motivation, skills, knowledge) and external conditions (environment, culture, support systems) (Amabile, 1996).

Synectics and Associative Creativity

Prince and Gordon developed the synectics method, a structured approach to stimulating creativity through the combination of seemingly unrelated elements. Their observations of scientists and engineers revealed that specific

behavioral changes often precede moments of discovery. Synectics employs metaphors, analogies, and cognitive manipulations to accelerate idea generation and enhance creative performance.

Similarly, Mednick's associative theory posits that creativity arises from the formation of new combinations of ideas. The more distant the associations between concepts, the greater the level of creativity. Mednick identified three primary pathways to creative solutions:

1. Intuitive foresight
2. Recognition of similarities between distant elements
3. Transformation of one idea into another

This perspective highlights that creative thinking is fundamentally based on the ability to form novel connections between previously unrelated ideas (Mednick, 1962).

Educational and Humanistic Perspectives

Robinson (2001) argued that creativity is not limited to gifted individuals but is an inherent human capacity. Every individual possesses creative potential, although its level of development varies. He also emphasized the importance of emotional states in the creative process and stressed the need for educational systems to adapt to the demands of a rapidly changing world in order to nurture creativity effectively.

From a behaviorist perspective, creativity is not viewed as an autonomous human initiative but rather as the result of the interaction between genetic and environmental factors. Skinner suggested that behavior, including creative behavior, can be shaped through reinforcement and environmental conditioning.

In contrast, humanistic psychologists such as Rogers (1961) and Maslow (1968) viewed creativity as a mechanism of self-expression and self-actualization. Maslow, in particular, considered creativity a universal human trait inherent in all individuals and closely linked to personal growth and fulfillment. Adler, representing the compensatory approach, interpreted creativity as a means of overcoming personal deficiencies and achieving psychological balance.

Cognitive Processes and Brain Function

Cognitive theories of creativity emphasize the role of thinking processes and intellectual operations. Researchers such as Guilford, Gordon, and Wallas explored the relationship between cognition and creativity, focusing on problem-solving, mental flexibility, and the interaction between different types of thinking.

Neuroscientific research has demonstrated the functional specialization of the brain hemispheres. The left hemisphere is primarily associated with logical reasoning and verbal processing, while the right hemisphere is linked to spatial awareness, imagery, and creative thinking. Although modern research suggests more integrated brain functioning, this distinction remains useful for understanding cognitive aspects of creativity.

Furthermore, studies of the creative process indicate that intense conscious effort is often followed by a period of incubation, during which the problem is processed unconsciously. This aligns with psychoanalytic theories proposed by Freud and Jung, who argued that unconscious mental processes are the primary source of creativity, and that creative insights emerge independently of conscious control.

Investment Theory of Creativity

Sternberg and Lubart (1995) proposed the investment theory of creativity, which conceptualizes creative individuals as those who "buy low and sell high" in the realm of ideas. This metaphor suggests that creative individuals pursue novel, unconventional, and often undervalued ideas, despite initial resistance from society.

According to this theory, creativity requires the integration of six interrelated resources:

1. Intellectual abilities
2. Knowledge
3. Thinking styles
4. Personality traits
5. Motivation
6. Environment

This model underscores the complexity of creativity and highlights the importance of both internal and external factors in the creative process.

Creative Personality and Environmental Conditions

Csikszentmihalyi (1990) described the creative individual as someone who embodies a wide range of human traits, integrating seemingly contradictory characteristics such as discipline and spontaneity, introversion and extroversion, and independence and adaptability. He emphasized the interconnected relationship between values, personality, and creativity, suggesting that sustained attention to problems is essential for creative development.

The role of the environment has also been widely recognized. Rogers identified three key conditions necessary for fostering creativity:

1. Openness to experience – an environment that encourages exploration and removes rigid constraints
2. Internal locus of evaluation – the ability to assess ideas independently of external criticism
3. Freedom to play with ideas – tolerance for experimentation and flexibility in thinking

These conditions create a supportive context in which creative potential can flourish.

McFadzean further identified characteristics of creative individuals, including goal orientation, high motivation, curiosity, self-confidence, risk tolerance, and the ability to connect unrelated concepts and evaluate alternative perspectives.

Creativity as Product, Process, and System

A product can be considered creative if it is new, original, and valuable, whether it is a physical object, an idea, a service, or a process. The concept of novelty extends beyond tangible outputs to include intangible innovations and conceptual advancements.

The analysis of international literature demonstrates that creativity should be understood as a systemic phenomenon, encompassing:

- Person (individual traits)
- Process (cognitive and emotional mechanisms)
- Product (creative outcomes)
- Environment (contextual influences)

This integrative perspective confirms that creativity cannot be fully explained by any single factor but must be analyzed within a broader, multidimensional framework.

Final Analytical Insight

The diversity of theoretical approaches indicates that creativity remains a complex and evolving concept. Each theory captures only one aspect of the phenomenon, and no single framework provides a complete explanation. Therefore, a comprehensive understanding of creativity requires an integrative approach that considers cognitive, motivational, environmental, and cultural dimensions simultaneously.

Richard Florida examined the capacity of cities to attract creative individuals and emphasized the growing importance of creativity in contemporary economic systems. According to Florida (2002), modern societies are increasingly structured around the creative potential of individuals, and sustainable development depends on the ability to attract and retain creative talent. His well-known "3T model"—comprising talent, technology, and tolerance—suggests that a creative environment must integrate technological advancement, a highly skilled and creative workforce, and openness to diversity and new ideas (Florida, 2002).

In this framework, technological infrastructure (technology), human capital (talent), and social inclusiveness (tolerance) function as interdependent components. The balance among these elements is essential for fostering creativity within societies (Florida, 2002; Albert & Runco, 1999). Furthermore, political and cultural contexts significantly influence creative potential. Repressive or authoritarian environments tend to inhibit creativity, whereas open and tolerant societies promote innovation and intellectual freedom.

Philosophical Foundations of Creativity

The concept of creativity has long been explored within philosophy, psychology, and pedagogy, each offering distinct interpretations of its essence and development.

Plato viewed creativity as a generative force, stating that "everything that comes into existence is a result of creative activity" (Plato, 1969). In ancient philosophy, creativity was understood as the capacity to introduce new perspectives and reinterpret reality.

Kant (1964) emphasized the uniqueness and transformative nature of novelty, arguing that creativity is inherently subjective and tied to individual cognitive capacities. According to Kant, originality serves as both a source of innovation and a mechanism for stimulating intellectual engagement.

Spinoza (1957) approached creativity from a more ontological perspective, associating it directly with human activity and considering it a fundamental condition of existence. In his view, creativity is not merely an intellectual function but an essential aspect of human nature.

Creativity as Activity, Process, and Self-Actualization

Modern theoretical approaches conceptualize creativity as a multidimensional phenomenon encompassing activity, process, and personal development. Creativity can be defined as:

- Activity: the production of qualitatively new, original, and socially significant outcomes
- Process: the development of the individual through the creation of material and spiritual values
- Self-actualization: the realization of personal potential through creative engagement (Chapok, 2009)

This perspective aligns with humanistic psychology, which emphasizes creativity as a pathway to personal growth and fulfillment (Maslow, 1968; Rogers, 1961).

Levels and Dimensions of Creativity

Contemporary researchers have proposed various classifications of creativity. British scholars Das, Dewhurst, and Gray (2011) distinguished between two levels of creativity:

1. Everyday creativity, inherent in human thinking and experience
2. High-level creativity, associated with scientific discoveries, inventions, and professional achievements

This distinction highlights that creativity operates across different domains and levels of complexity.

Similarly, Vygotsky (2001) defined creativity as human activity aimed at producing something new, encompassing not only external products but also internal experiences such as emotions, perceptions, and imagination.

Pedagogical Creativity and Educational Contexts

In modern psycho-pedagogical literature, the concept of pedagogical creativity remains subject to debate. Some scholars consider it a distinct field within pedagogy, while others interpret it as an integral component of teaching practice and educational innovation (Andreev, 2002).

Educational systems play a crucial role in fostering creativity by creating environments that encourage exploration, critical thinking, and independent learning. The development of creative competencies in learners requires not only methodological innovation but also supportive institutional frameworks.

Three-Dimensional Model of Creativity

Rita Bebre conceptualized creativity through three interconnected dimensions:

1. Personality traits – including originality, innovativeness, courage, and nonconformity
2. Process – involving creative intuition, imagination, divergent thinking, and both conscious and unconscious mental activity
3. Product – the creation of socially valuable innovations, whether material or immaterial

This model aligns with Rhodes' (1961) well-known 4P framework (person, process, product, press), emphasizing the multidimensional nature of creativity.

Creativity as Novelty and Value

Across most theoretical approaches, creativity is consistently defined as the production of something new and valuable. Originality and value are considered the primary criteria distinguishing creative processes and outcomes (Runco & Jaeger, 2012; Sternberg & Lubart, 1995).

Originality refers to the uniqueness and innovativeness of ideas, while value relates to their usefulness, relevance, and impact within a given context. Thus, creativity is not merely about novelty but about meaningful innovation that contributes to individual and societal development.

Table 1. Major Theoretical Approaches and Factors Influencing Creativity

Theoretical Approach / Author	Key Concept	Main Components	Contribution to Creativity Research

J. P. Guilford (1950)	Structure of Intellect	Divergent thinking (fluency, flexibility, originality), evaluation, convergent thinking	Introduced cognitive basis of creativity and measurement through divergent thinking
E. P. Torrance (1974)	Creative Thinking Measurement	Problem sensitivity, idea generation, hypothesis testing, communication	Developed TTCT, standardized creativity assessment tools
Teresa M. Amabile (1996)	Componential Model	Intrinsic motivation, domain expertise, creative thinking skills, environment	Highlighted motivation as key driver of creativity
Robert J. Sternberg & Todd Lubart (1995)	Investment Theory	Intelligence, knowledge, thinking styles, personality, motivation, environment	Explained creativity as "buy low, sell high" idea development
Mihaly Csikszentmihalyi (1990)	Systems Model	Individual, domain, social field	Emphasized interaction between person and society
Howard Gardner (1993)	Multiple Intelligences	Linguistic, logical, spatial, interpersonal, etc.	Linked creativity to domain-specific intelligences
Mednick (1962)	Associative Theory	Combination of distant ideas, analogy, intuition	Defined creativity as new associations
Edward de Bono (1993)	Lateral Thinking	Non-linear thinking, idea restructuring	Introduced practical techniques for creative thinking
Graham Wallas (1926)	Creative Process Model	Preparation, incubation, illumination, verification	Explained stages of creative thinking
Richard Florida (2002)	3T Model	Talent, technology, tolerance	Linked creativity to economic and urban development
Abraham Maslow (1968)	Self-Actualization Theory	Personal growth, intrinsic motivation	Positioned creativity as a human need
Carl Rogers (1961)	Humanistic Approach	Openness, autonomy, internal evaluation	Emphasized environment and personal freedom

Analytical Conclusion

The analysis of socio-economic, philosophical, and pedagogical perspectives demonstrates that creativity is a complex and multifaceted phenomenon shaped by cultural, cognitive, and environmental factors. It cannot be reduced to a single dimension but must be understood as a dynamic interaction between individual capacities, social conditions, and contextual influences.

In contemporary knowledge-based economies, creativity has become a central driver of innovation and progress. Therefore, fostering creativity requires not only individual effort but also supportive educational systems, inclusive societies, and adaptive cultural frameworks.

Findings

The analysis of theoretical and empirical sources reveals several key findings regarding the nature and formation of creativity:

First, creativity is a multicomponent phenomenon that emerges from the interaction of cognitive abilities, personality traits, motivation, and environmental conditions. None of these factors alone is sufficient to produce creative outcomes.

Second, intrinsic motivation has been identified as a central determinant of creativity. Individuals who are internally motivated are more likely to engage deeply with tasks, persist in problem-solving, and generate innovative ideas (Amabile, 1996; Runco, 2007).

Third, domain-specific knowledge and experience play a crucial role in enabling creative performance. Expertise provides the necessary foundation for generating meaningful and contextually relevant innovations (Weisberg, 1999).

Fourth, creative thinking skills, particularly divergent thinking, are essential for producing novel and original ideas. These skills involve flexibility, imagination, and the ability to form associations between seemingly unrelated concepts (Guilford, 1950; Mednick, 1962).

Fifth, the environment significantly influences creativity. Supportive, open, and tolerant environments foster creative expression, whereas restrictive or authoritarian contexts tend to suppress it (Florida, 2002; Rogers, 1961).

Finally, creativity can be understood through multiple dimensions, including process, product, personality, and environment, confirming its complex and systemic nature.

Conclusion

Creativity is a multifaceted and dynamic phenomenon that plays a crucial role in individual development and societal progress. The present study demonstrates that creativity emerges from the interaction of multiple factors, including intrinsic motivation, domain-specific expertise, cognitive abilities, and environmental influences.

The analysis of theoretical approaches indicates that no single framework is sufficient to fully explain creativity. Instead, an integrative perspective is required, combining insights from psychology, philosophy, education, and socio-economic studies.

In contemporary knowledge-based societies, creativity has become a key driver of innovation, economic growth, and cultural development. Therefore, fostering creativity should be a priority for educational systems, organizations, and policymakers. This requires creating environments that encourage curiosity, independent thinking, and openness to new ideas.

Future research should focus on developing interdisciplinary models of creativity and exploring its application in real-world contexts, particularly in education and innovation systems.

Ethical Statement

This study is based on theoretical analysis and review of existing literature and does not involve human participants, animals, or any experimental procedures requiring ethical approval. The author confirms that the research was conducted in accordance with accepted academic and ethical standards. All sources used in this study have been properly cited, and no form of plagiarism has been involved.

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Conflict of Interest

The author declares that there is no conflict of interest regarding the publication of this paper. The research was conducted independently, and no financial or personal relationships influenced the work reported in this article.

AI Use Statement

The author acknowledges the use of artificial intelligence tools for language editing, structuring, and improving the clarity of the manuscript. All intellectual content, analysis, and conclusions presented in this study are the original work of the author. The author takes full responsibility for the accuracy, integrity, and originality of the content.

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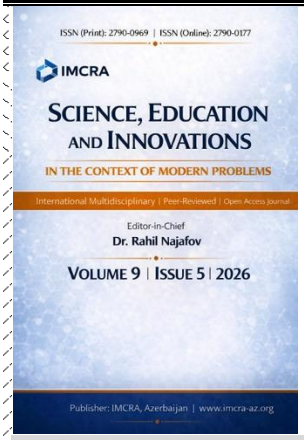
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RESEARCH ARTICLE

The Role of Primary Education in the Socialization of Blind Children: A Qualitative Study of Pedagogical Strategies, Behavioral Adaptation, and Inclusive Support Systems

Vera Remazhevskaya

PhD in Pedagogy, Associate Professor
Director of the Educational Rehabilitation Center "Levenya", Lviv
Ukraine
Email: nigarzeynalova777@gmail.com; https://orcid.org/0000-0002-5107-8540

Keywords

Inclusive education, Visual impairment, Blind children, Primary school inclusion, Special educational needs (SEN), Classroom behavior, social interaction, Pedagogical strategies, Inclusive resource centers, Teacher–parent collaboration

Abstract

This article examines the inclusion of children with visual impairments in primary education through three interrelated dimensions: (1) the essential conditions required for successful school participation of a visually impaired child; (2) the specific roles and activities of Inclusive Resource Center (IRC) professionals in supporting such inclusion; and (3) the behavioral characteristics of blind children in play, communication, and learning, and their influence on peer relationships within the classroom environment. Particular attention is given to key success factors, including effective collaboration between parents and school staff, teachers' readiness to understand the unique circumstances of families raising children with visual impairments, and the importance of empathy, sensitivity, and professional tact in communication with parents. Another critical prerequisite for successful inclusion is the preparation of sighted students for the arrival of a blind peer, fostering a supportive and inclusive classroom culture. The study emphasizes that IRC specialists should not position themselves as absolute authorities in the education and rehabilitation of blind children. Instead, through continuous collaboration with schools, they can enhance their professional competence, deepen their understanding of children's behavioral patterns across various activities, and provide context-sensitive support when necessary. Furthermore, the article addresses specific behavioral responses of blind children in unfamiliar environments, strategies for creating comfortable and inclusive educational conditions for both visually impaired and sighted students, and the developmental benefits that blind children gain from meaningful inclusion characterized by real-life interaction and peer communication.

Citation

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Introduction

The inclusion of a blind child in a general secondary education institution, based on both professional experience and contrary to widespread public perception, remains a relatively rare and significant event in Ukraine. In this context, inclusion should not be understood merely as physical coexistence under one roof, but rather as genuine belonging—an environment where blind and sighted children live, learn, and interact together without a sense of separation or exceptionality.

True inclusion is characterized by emotional comfort, the opportunity to form friendships, and active participation in shared educational experiences. Learning becomes a collective and open process, not confined to isolated or segregated settings.

This study focuses on three key aspects of including children with visual impairments in primary school:

- the necessary conditions for ensuring successful school participation;

- the professional activities of Inclusive Resource Center specialists within inclusive educational settings;
- the behavioral characteristics of blind children in play, communication, and learning, and their impact on classroom dynamics and peer relationships.

The analysis is grounded in the author's professional observations, the experiences of colleagues from various European countries, and the results of a nationwide pedagogical experiment conducted at the Lviv Regional Council's Educational Rehabilitation Center "Levenya." It is important to note that inclusion remains a complex and distinctive process not only for blind children but also for children with low vision.

Inclusive education has emerged as a central principle of modern educational systems, reflecting a broader commitment to equity, human rights, and social participation. International frameworks such as the UNESCO Global Education Monitoring Report emphasize that inclusion is not merely the physical placement of children with disabilities in mainstream schools, but rather their meaningful participation, sense of belonging, and access to quality education (UNESCO, 2020). Within this paradigm, the inclusion of children with visual impairments presents both significant opportunities and complex pedagogical challenges.

Primary school represents a critical stage in the life trajectory of a blind child. It is often the first structured environment in which the child engages with a broader social group beyond the family, encountering new expectations, relationships, and forms of interaction. This transition plays a decisive role in the development of self-concept, independence, and social identity. However, the absence of visual perception fundamentally alters the child's mode of experiencing the world, requiring adapted teaching approaches, supportive environments, and carefully structured social integration (McLinden et al., 2016; Douglas et al., 2019).

Despite growing policy support for inclusive education, the practical implementation of inclusion for blind children remains uneven across contexts. Challenges include insufficient teacher preparation, lack of specialized support, misconceptions among parents and peers, and difficulties in creating inclusive classroom dynamics (Ainscow, 2020; OECD, 2021). At the same time, successful inclusion offers profound developmental benefits—not only for blind children, but also for their sighted peers, who gain enhanced empathy, social awareness, and adaptive communication skills.

This article aims to analyze the inclusion of blind children in primary school through three interconnected dimensions: (1) the conditions necessary for successful inclusion; (2) the role of inclusive resource centers and collaborative support systems; and (3) the behavioral characteristics of blind children and their influence on classroom relationships. Drawing on professional experience and international research, the study seeks to contribute to a deeper understanding of inclusive practices and their practical implications.

Literature Review

The concept of inclusive education has been widely examined in educational research, with scholars emphasizing its multidimensional nature, encompassing pedagogical, social, and institutional aspects. According to Ainscow (2020), inclusion should be understood as a process aimed at identifying and removing barriers to participation, rather than simply accommodating individual differences. Similarly, Florian (2019) argues that inclusive pedagogy requires a shift from deficit-oriented approaches toward recognizing diversity as a normal and valuable aspect of human development.

In the context of visual impairment, research highlights the importance of specialized support and adaptive teaching strategies. McLinden et al. (2016) emphasize that children with visual impairments rely heavily on tactile, auditory, and kinesthetic modalities, which necessitates differentiated instructional approaches and additional time for learning tasks. Douglas et al. (2019) further note that successful inclusion depends on the alignment of environmental, pedagogical, and social factors, including classroom organization, teacher competence, and peer relationships.

A significant body of literature has focused on teachers' attitudes toward inclusion, identifying them as a critical determinant of success. Avramidis and Norwich (2002) demonstrate that positive teacher attitudes are associated with higher levels of student participation and improved learning outcomes. However, these attitudes are often influenced by factors such as training, experience, and perceived support. Hewett et al. (2017) highlight that teachers working with visually impaired students frequently experience increased workload and stress, particularly in the absence of adequate institutional support.

The role of peer relationships has also been extensively studied. Research indicates that blind children may face social barriers due to differences in communication styles, slower response times, and limited access to nonverbal cues (Zebehazy & Smith, 2011). Kef (2002) emphasizes the importance of social support in promoting psychological well-being and successful adjustment. Structured interventions, including peer education and cooperative learning activities, have been shown to enhance social inclusion and reduce stigmatization (Florian, 2019).

From a systemic perspective, international organizations such as the Organisation for Economic Co-operation and Development and World Health Organization underline the importance of coordinated support systems, including collaboration between schools, families, and specialized services. The concept of a "collaborative triangle" (school–family–support services) is widely recognized as a key factor in achieving sustainable inclusion (OECD, 2021; WHO, 2019).

Furthermore, recent studies emphasize the cognitive and emotional demands placed on children with visual impairments. The need for constant spatial orientation, auditory processing, and tactile exploration results in increased cognitive load, which may affect attention, energy levels, and learning efficiency (Douglas et al., 2019). At the same time, inclusive environments have been shown to foster resilience, independence, and social competence, highlighting the dual nature of inclusion as both a challenge and an opportunity.

Overall, the literature suggests that successful inclusion of blind children requires a holistic approach that integrates pedagogical adaptation, social support, professional collaboration, and continuous reflection.

Discussion

The findings of this study provide important insights into the complex and multidimensional nature of inclusive education for blind children in primary school settings. Consistent with previous research, inclusion is not merely a structural or organizational arrangement but a dynamic pedagogical and social process that requires continuous adaptation and coordination among all participants (Ainscow, 2020; Florian, 2019).

One of the central findings of this study—the increased time demands and cognitive load experienced by blind children—aligns with earlier research emphasizing the sequential nature of non-visual perception. Unlike sighted learners, blind children must process information through tactile and auditory channels, which requires greater cognitive effort and leads to earlier fatigue (Douglas et al., 2019; McLinden et al., 2016). This confirms that inclusive classrooms must adopt flexible pacing and differentiated instruction to accommodate diverse learning modalities.

The observed behavioral responses—particularly passive withdrawal and active resistance—can be interpreted within the broader framework of adaptation to uncertainty. Similar findings have been reported in studies highlighting the role of predictability and structured environments in supporting children with visual impairments (Hewett et al., 2017). The present study extends this understanding by demonstrating that such behaviors are not indicators of maladjustment but rather adaptive strategies in response to insufficient preparation or unclear expectations.

Social interaction remains one of the most challenging aspects of inclusion. The findings support existing literature indicating that blind children often face difficulties due to differences in communication patterns and the absence of visual cues (Zebehazy & Smith, 2011). However, this study contributes further by illustrating how these challenges can be mitigated through intentional pedagogical mediation and peer preparation. In line with Avramidis and Norwich (2002), the role of the teacher is critical in shaping peer attitudes and fostering inclusive social dynamics.

A particularly significant contribution of this study is the identification of a paradox of support, whereby necessary pedagogical assistance may be perceived by sighted peers as preferential treatment. This finding resonates with broader discussions in inclusive education regarding equity versus equality and highlights the importance of transparent communication within the classroom (Loreman et al., 2014). Teachers must balance individualized support with group cohesion, ensuring that all students understand the purpose and necessity of differentiated instruction.

The proposed Three-Level Inclusive Adaptation Framework offers a conceptual synthesis of the findings and provides a structured lens through which inclusion can be understood and implemented. By integrating individual, social, and institutional dimensions, the framework reflects the systemic nature of inclusion emphasized in international policy documents (OECD, 2021; UNESCO, 2020). Unlike many existing models that focus primarily on either pedagogical strategies or social integration, this framework highlights the interdependence of all levels and the necessity of their alignment.

Furthermore, the findings confirm that inclusive education produces reciprocal benefits. While blind children develop independence, resilience, and social competence, sighted peers gain empathy, tolerance, and enhanced social awareness. This dual impact supports the argument that inclusion is not a compensatory approach but a transformative educational model that benefits all learners (UNICEF, 2021).

Despite these contributions, the study has certain limitations. The qualitative nature of the research and the relatively small sample size limit the generalizability of the findings. Future research could incorporate mixed-method approaches and larger samples to validate and expand the proposed framework. Additionally, longitudinal studies would provide deeper insight into the long-term developmental outcomes of inclusive education for visually impaired children.

Overall, the discussion reinforces the conclusion that successful inclusion depends not on isolated interventions but on a holistic and coordinated approach that integrates pedagogy, social interaction, and institutional support.

Research Methodology

This study adopts a **qualitative empirical research design** aimed at exploring the inclusion of blind children in primary school settings. The research is grounded in long-term pedagogical practice and systematic observation within inclusive educational environments.

Research Design

The study follows a descriptive-analytical and qualitative approach, combining:

- participant observation,

- reflective practice,
- and case-based analysis.

Such an approach is widely used in inclusive education research, particularly when examining behavioral patterns, social interaction, and classroom dynamics (Florian, 2019; McLinden et al., 2016).

Participants and Setting

The empirical component of the study is based on observations conducted in:

- inclusive primary school classrooms in Ukraine,
- and the Educational Rehabilitation Center "Levenya" (Lviv).

The study includes:

- 8 blind children (aged 6–10),
- 12 primary school teachers,
- 4 Inclusive Resource Center (IRC) specialists,
- and indirect interaction with sighted peers (approx. 120 students).

The selected participants represent typical cases of inclusive education in primary school environments.

Data Collection Methods

Data were collected using the following qualitative methods:

1. Participant Observation

Long-term observation of blind children in:

- classroom activities,
- play situations,
- and social interactions.

Special attention was given to:

- behavioral responses,
- communication patterns,
- and adaptation processes.

2. Semi-Structured Interviews

Informal and semi-structured interviews were conducted with:

- teachers,
- IRC specialists,
- and parents.

The interviews focused on:

- challenges of inclusion,
- support strategies,
- and perceptions of the child's development.

3. Case Study Analysis

Several individual cases were analyzed in depth to identify:

- recurring behavioral patterns,
- adaptation strategies,
- and critical points in the inclusion process.

Data Analysis

The collected data were analyzed using thematic analysis, allowing for the identification of key categories and patterns, including:

- cognitive load and time demands,
- behavioral adaptation,
- social interaction challenges,
- and support mechanisms.

The analysis followed an iterative process of:

1. data familiarization,
2. coding,
3. theme development,
4. interpretation.

Empirical Findings

1. Time-Dependent Learning Processes

The findings demonstrate that blind children require significantly more time for task execution, not only in visually dependent activities but also in general learning processes. This is due to reliance on tactile and auditory processing, which requires sequential rather than simultaneous perception (Douglas et al., 2019).

For example, simple classroom routines—such as organizing materials—require structured, step-by-step engagement, leading to slower participation compared to sighted peers.

2. Cognitive Load and Energy Expenditure
A key empirical observation is the high cognitive load experienced by blind children. They must continuously:

- orient themselves in space,
- process auditory signals,
- and interpret tactile information.

This results in early fatigue and reduced capacity for sustained attention during lessons (WHO, 2019).
3. Behavioral Response to Uncertainty
Two dominant behavioral patterns were identified:

- Passive withdrawal (avoidance, silence, disengagement)
- Active resistance (verbal protest, refusal, agitation)

These responses occur primarily in situations where:

- the activity is not explained in advance,
- or the child is unexpectedly guided into unfamiliar contexts.

4. Social Interaction Barriers
Blind children actively seek communication but often use non-typical interaction strategies, such as:

- tactile contact,
- close physical proximity,
- or interruptive entry into peer groups.

These behaviors are frequently misunderstood by sighted peers, leading to:

- exclusion,
- conflict,
- or social distancing (Zebehazy & Smith, 2011).

5. Dependence vs. Perceived Privilege
The need for teacher support creates a paradox:

- for the child → necessary support
- for peers → perceived inequality

This perception can negatively affect group dynamics if not pedagogically managed.
6. Importance of Structured Environment
Children showed better adaptation in classrooms where:

- routines were consistent,
- instructions were verbalized,
- and spatial organization remained stable.

Adaptation occurs gradually and requires repetition over time.
7. Positive Developmental Outcomes
Despite challenges, empirical evidence confirms:

- increased independence,
- improved social competence,
- and higher self-confidence among blind children.

At the same time, sighted peers develop:

- empathy,
- tolerance,
- and inclusive social skills (Ainscow, 2020).

The Role of Primary School in the Socialization of a Blind Child

For a blind child, the first experience of attending primary school—similar to that of sighted children—represents a significant transition beyond the familiar boundaries of family and preschool environments (if such experience exists). It marks the beginning of broader social interaction with a larger group of individuals and the first encounter with structured societal expectations.

The process of separation from parents is particularly critical for blind children, who are often raised in conditions of heightened parental care or overprotection due to their vulnerability. This transition requires careful emotional and pedagogical support, as it plays a fundamental role in fostering independence and social adaptation.

Primary school becomes the first major "social institution" in a child's life, serving as a gateway to integration into the wider world of sighted individuals. It is also within this environment that the child begins to develop self-awareness, including the realization of difference—an understanding often articulated as "being blind."

This stage can involve the child's first experiences of internal conflict associated with recognizing their uniqueness in comparison to peers. Such experiences may be emotionally challenging but are also essential for identity formation and long-term social integration.

Thus, primary school plays a dual role: it is both a space of opportunity—offering communication, learning, and development—and a setting where the child encounters and processes the complexities of difference, belonging, and self-perception within a predominantly sighted community.

Conditions and Pedagogical Factors for the Successful Inclusion of a Blind Child in Primary School

Attendance at primary school can play a crucial role in fostering a sense of self-worth in a child with special educational needs. For a blind child, this experience often becomes a foundation for developing self-confidence and personal agency, expressed in attitudes such as: *"Despite the absence of vision, I am capable,"* and, in some cases, even *"I am capable because I am blind."*

In order to ensure the successful inclusion of a blind child in a general secondary education institution, it is necessary to identify and carefully consider a number of key factors. The selection of an appropriate primary school is a process that requires sufficient time and thoughtful evaluation. It should be noted that the school closest to the child's place of residence is not always the most suitable option. At the request of parents, professionals from Inclusive Resource Centers (IRCs) may provide valuable support in identifying an appropriate educational environment. Preliminary consultations with school staff are essential during this selection process.

It is important to seek understanding not only from classroom teachers but also from school administration and relevant educational authorities, as these bodies are responsible for providing institutional and methodological support to educators throughout the inclusion process.

Advance preparation and comprehensive informing of teachers and other pedagogical staff are critically important. Educators must clearly understand what the inclusion of a blind child entails, including increased time investment, emotional engagement, and the need for adaptive teaching strategies. They should also be aware of available support mechanisms, such as consultations with IRC specialists, collaboration with parents, and access to methodological resources.

A teacher can make an informed decision to accept a blind child into the classroom only when fully equipped with relevant knowledge and understanding. Such awareness enables the teacher to consciously express readiness to work under new and more complex conditions, involving revised teaching content, innovative methodologies, and differentiated approaches to instruction and upbringing (education and upbringing). Based on professional experience, preliminary orientation and training often serve as the first and most important form of support for educators, helping to alleviate anxiety and build confidence. As teachers themselves often acknowledge, initial expectations of inclusion may differ significantly from the realities encountered in practice; however, early preparation reduces fear and enhances adaptability.

In order for blind and sighted children to establish effective communication and mutual understanding, the teacher must be prepared to abandon rigid pedagogical stereotypes. Flexibility, creativity, and patience are essential competencies. The teacher should be capable of identifying and implementing individualized solutions, such as gradually introducing the child to the temporal rhythm of school life, adapting to new expectations, integrating into the peer group, and navigating the school environment.

Temporary compromises that may occur during the initial stages—such as allowing parents to remain in the classroom—should be carefully reassessed and gradually phased out by the teacher to support the child's independence and social integration.

A fundamental condition for successful inclusion is the active and continuous cooperation between parents and school staff. From the parents' perspective, this includes, first, consistent support of the child throughout the educational process, and second, a willingness to engage in compromise. Parents who adopt flexible and context-sensitive approaches to problem-solving are better able to avoid misconceptions about inclusion—such as the belief that all activities must be identical for all children at all times, or that a blind child must always perform exactly the same tasks as their sighted peers without adaptation.

Another essential factor in fostering positive collaboration between school staff and families is the willingness of educators to understand the unique circumstances of raising a child with visual impairments. This requires attentiveness, empathy, and professional tact in communication with parents, who are often emotionally vulnerable. Such vulnerability may stem from previous negative experiences with educational institutions, healthcare providers, or broader societal attitudes.

From practical experience, it is evident that transparency and the provision of adequate information to parents of sighted children are also critical for successful inclusion. In the absence of clear communication, these parents may develop concerns that the presence of a blind child in the classroom will reduce the level of attention given to their own children. Such concerns are legitimate and should be openly acknowledged and addressed by educators.

Open dialogue and continuous information exchange between school staff and all parents contribute to positive outcomes. Over time, parents of sighted children begin to recognize the broader benefits of inclusion—not only for the blind child but

also for their own children, particularly in terms of social development, empathy, tolerance, and the acquisition of meaningful life experiences.

Preparation of the Educational Environment and the Role of Support Systems in the Inclusion of Blind Children

Another critical prerequisite for a successful start and sustainable implementation of inclusion is the preparation of sighted students for the arrival of a blind child in the classroom. This preparation should not be limited to verbal explanations or the provision of abstract information. Instead, it should include experiential and interactive activities—such as simulation-based games in which children temporarily experience the condition of "not seeing." Such approaches have been shown to foster empathy, reduce anxiety, and promote inclusive attitudes among peers (Avramidis & Norwich, 2002; Ainscow, 2020).

It is equally important to explain, in an age-appropriate and transparent manner, how individuals perceive and navigate the world without vision. This process should avoid ambiguity or taboo and should involve continuous pedagogical commentary on everyday classroom situations, both during lessons and in extracurricular activities. Ongoing dialogue helps normalize difference and supports the development of a cohesive classroom community (Florian, 2019).

The selection of the classroom itself is also a significant factor. Classes with a smaller number of students are generally more conducive to successful inclusion, as they allow for greater flexibility and individualized attention. During the initial stage of school attendance, it may be pedagogically appropriate to limit the duration of the school day—for example, by gradually increasing the number of lessons—to facilitate adaptation to the new environment (McLinden et al., 2016).

An essential condition for effective inclusion is the availability of additional support personnel within the classroom. This may include a trained teaching assistant with expertise in working with visually impaired children. Innovative solutions to staffing challenges may involve rotational support from school-based professionals (such as psychologists or social workers), the engagement of student interns, or the involvement of trained volunteers. Such collaborative staffing models are consistent with international best practices in inclusive education (Hewett et al., 2017; UNESCO, 2020).

Interestingly, based on professional experience, the physical infrastructure of the school and its interior design, while important, are not the primary determinants of successful inclusion—at least in the initial stages. Cases have been observed in which highly effective inclusion was achieved in modest physical environments, where material resources were limited, but where the educational philosophy strongly emphasized inclusive pedagogy and life-oriented learning. In such contexts, the guiding principle of "teaching for life" became the foundation of the institution's approach to education (Slee, 2018).

Feedback from teachers further indicates that continuous professional development and, where possible, access to supervision or mentoring are crucial factors throughout the inclusion process. Educators frequently report that communication with colleagues who have similar experience—particularly those who have worked with blind students—provides significant emotional support and practical insight. The exchange of experiences fosters innovation, professional growth, and a sense of solidarity, reinforcing the understanding that teachers are not alone in their efforts to integrate blind children into mainstream educational environments (Douglas et al., 2019).

In addressing the complex challenges associated with the inclusion of children with special educational needs, professionals from Inclusive Resource Centers (IRCs) play a vital role. Through consultation, guidance, and continuous support, they assist schools in identifying effective strategies tailored to the individual needs of each child (OECD, 2021).

Before outlining specific forms of support, it is essential to conceptualize the role of IRC professionals as collaborative partners rather than authoritative experts. Effective inclusion depends on a balanced and reciprocal relationship between IRC specialists and general education institutions. IRC staff should not position themselves as possessing absolute knowledge in the education, upbringing, and rehabilitation of blind children. Instead, collaboration with schools provides them with valuable opportunities for professional development, enabling a deeper understanding of the child's behavior across various contexts and the refinement of intervention strategies (Florian, 2019).

Importantly, teachers respond positively when IRC professionals avoid imposing rigid requirements—such as the expectation that blind children must always be taught individually according to strict tiflopedagogical principles. Rather, inclusion in a mainstream classroom already represents a complex pedagogical task that demands high levels of professional competence, adaptability, and reflective practice from educators (McLinden et al., 2016).

Drawing on many years of collaboration between the Educational Rehabilitation Center "Levenya" and general secondary education institutions, a structured "List of Recommended Forms of Cooperation and Support" has been developed. These recommendations can be applied flexibly, depending on the specific needs of each case. Similar to a modular system—comparable to LEGO construction—some elements may serve as core components, while others function as supplementary supports, allowing educators to design individualized and context-sensitive inclusion strategies.

Models of Support, Collaborative Practices, and Behavioral Adaptation in the Inclusion of Blind Children

A structured and flexible system of pedagogical support is essential for ensuring the effectiveness of inclusive education for blind children. Based on long-term practical experience, this system can be conceptualized as a modular "framework of support elements," where each component contributes to the overall success of inclusion and can be adapted to the specific needs of the child, school, and family context (Ainscow, 2020; UNESCO, 2020).

One of the foundational elements of this framework is the provision of comprehensive information. This includes knowledge about eye conditions, their impact on visual perception, spatial orientation, and mobility, as well as preventive strategies and basic principles of orientation and movement. Such informational support enhances teachers' professional competence and reduces uncertainty when working with visually impaired learners (Douglas et al., 2019; McLinden et al., 2016).

Equally important are regular professional consultations between Inclusive Resource Center (IRC) specialists and classroom teachers. These consultations focus on the behavioral characteristics of blind children, including potential difficulties in everyday school situations and crisis scenarios. Joint reflection on pedagogical challenges—such as organizing routine activities (e.g., using the restroom, mealtimes) or determining appropriate levels of independence and privacy—enables the development of context-sensitive and practical solutions (Florian, 2019; Hewett et al., 2017).

Classroom observation constitutes another critical form of support. Through lesson visits, IRC professionals can observe how the blind child interacts with different teachers and peers, as well as conduct individual or corrective sessions within the school environment. These visits also facilitate the joint adaptation of classroom spaces, including the development of mobility routes (e.g., from classroom to cafeteria or restroom) and the implementation of tactile or visual markers to support orientation (World Health Organization, 2019).

The presence of IRC specialists in the classroom further allows for the modeling of inclusive interactions. For instance, during structured or spontaneous classroom activities, specialists can demonstrate appropriate ways for sighted children to communicate and interact with a blind peer. Additionally, intentionally designed scenarios—such as introducing a "guest" into the classroom—can reveal authentic social dynamics and the actual status of the blind child within the peer group. These observations provide valuable insights for both teachers and specialists and support reflective pedagogical practice (Avramidis & Norwich, 2002).

Individual sessions with IRC professionals also serve multiple purposes beyond their primary corrective or developmental objectives. They can help reduce the cognitive and emotional load experienced by the child during regular lessons and prepare the child for participation in collective classroom activities. Moreover, small-group sessions involving a few students (e.g., 3–4 children) can foster peer bonding, improve social cohesion, and provide opportunities for targeted behavioral interventions in stressful situations (Kef, 2002).

Collaboration between IRC specialists, teachers, and teaching assistants is particularly important in adapting instructional materials and the learning environment. This may involve selecting appropriate didactic resources, modifying classroom layouts, providing specialized literature or educational media, and organizing professional development activities such as workshops, seminars, and inter-school meetings. Such initiatives promote knowledge exchange, enhance teacher preparedness, and contribute to the dissemination of inclusive practices across educational institutions (OECD, 2021).

A crucial function of IRC professionals is their role as mediators between the school and the family. This role extends beyond conflict resolution and includes facilitating communication, aligning expectations, and ensuring that the child's needs are consistently addressed across both educational and home environments. Research consistently highlights that strong home–school collaboration significantly improves outcomes for children with special educational needs (UNICEF, 2021).

Importantly, all forms of support must remain flexible and responsive to the individual needs of the child and the evolving context of inclusion. The frequency and format of IRC involvement should not be rigid or formalized but should instead be guided by the child's developmental trajectory and the needs of the family and school. Effective inclusion emerges from a dynamic and coordinated partnership between three key stakeholders: the school, the family, and the IRC. Only through such a "collaborative triangle" can inclusive practices achieve sustainable and meaningful outcomes (Ainscow, 2020).

Behavioral Characteristics of Blind Children and Their Impact on Classroom Relationships

Understanding the behavioral patterns of blind children is essential for fostering positive social relationships within inclusive classrooms. The daily life of a primary school class that includes a blind child is inherently dynamic and multifaceted, reflecting the diversity of personalities and interactions typical of early childhood education environments.

Despite this diversity, certain recurring behavioral tendencies can be identified based on long-term observations. One of the most prominent characteristics is the child's heightened need for safety, predictability, and emotional security. Particularly during the initial stages of school integration, blind children may experience significant disorientation due to unfamiliar routines, environments, and social expectations. This can manifest as anxiety, inattention, or withdrawal, making meaningful engagement in learning activities temporarily difficult (Zebehazy & Smith, 2011).

In such situations, the child's primary concern often revolves around understanding the sudden changes in their environment—what has changed, why it has changed, and how to adapt. The loss of a familiar sense of security can be distressing, and regaining this sense requires the establishment of consistent routines and predictable structures over time. Repetition of daily activities at fixed intervals, along with clear and stable expectations, enables the child to gradually rebuild a sense of control and confidence.

Empirical observations indicate that blind children may initially focus intensely on exploring specific elements of the school environment—such as staircases, corridors, or classroom layouts—sometimes over extended periods. Only after achieving a

sufficient level of familiarity and comfort with these spatial elements are they able to shift their attention to broader learning and social activities. This process underscores the importance of allowing sufficient time for orientation and adaptation, rather than imposing premature academic demands (McLinden et al., 2016).

Ultimately, the behavioral adaptation of a blind child is closely intertwined with the social climate of the classroom. A supportive, patient, and well-informed educational environment not only facilitates the child's adjustment but also positively influences peer relationships, promoting empathy, cooperation, and mutual understanding among all students (Florian, 2019; UNESCO, 2020).

Behavioral Dynamics, Cognitive Load, and Social Interaction Challenges of Blind Children in Inclusive Classrooms

A fundamental characteristic of blind children in inclusive educational settings is the need for significantly more time across all domains of activity, including communication, play, learning, and daily classroom routines. This temporal difference is not limited to visually dependent tasks but reflects broader cognitive and sensory processing requirements inherent in the absence of visual input (McLinden et al., 2016; Douglas et al., 2019).

In classroom situations, for example, a blind child often relies on tactile and olfactory exploration to understand objects and learning materials. Such multisensory engagement requires additional time and must be pedagogically supported rather than constrained. Similarly, routine activities—such as organizing school materials on a desk—take longer compared to sighted peers, which may lead to impatience among other students and, consequently, reduced willingness to engage collaboratively with the blind child (Hewett et al., 2017).

Blind children also require periodic breaks for rest and spatial reorientation. During lessons, they may exhibit behaviors that signal cognitive or emotional overload, such as standing up, withdrawing from the activity, or engaging in excessive verbalization. While these behaviors may disrupt classroom processes and affect peer concentration, they should be understood as adaptive responses to sensory and cognitive demands rather than as disciplinary issues (Florian, 2019; Zebehazy & Smith, 2011).

Table 1. Three-Level Inclusive Adaptation Framework for Blind Children

Level	Key Components	Main Challenges	Expected Outcomes
Level 1: Individual Adaptation	Cognitive processing (tactile, auditory), spatial orientation, emotional regulation, behavioral responses	High cognitive load, need for more time, anxiety in unfamiliar situations, dependence on routines	Development of self-confidence, improved orientation skills, emotional stability
Level 2: Social Integration	Peer interaction, communication patterns, participation in group activities, social identity formation	Miscommunication, social exclusion, lack of visual imitation, misunderstanding by peers	Increased empathy, peer acceptance, active participation in classroom life
Level 3: Institutional Support	Teacher competence, IRC involvement, family–school collaboration, adaptive environment	Lack of training, insufficient support systems, poor coordination between stakeholders	Sustainable inclusion, improved teaching practices, effective support systems

Table 2. Key Empirical Findings and Pedagogical Implications

Empirical Finding	Description	Pedagogical Implications
Time-Dependent Learning	Blind children require more time for tasks due to reliance on non-visual perception	Allow flexible timing, reduce pressure, provide step-by-step instruction
High Cognitive Load	Continuous need for orientation and sensory processing leads to fatigue	Include rest periods, simplify tasks, provide structured guidance
Behavioral Adaptation	Passive withdrawal or active resistance in unfamiliar situations	Clearly explain activities in advance, maintain predictable routines
Social Interaction Challenges	Differences in communication styles and tactile interaction	Teach peers inclusive communication, mediate social interactions
Dependence vs. Perceived Privilege	Teacher support may be perceived as favoritism by peers	Ensure balanced attention, explain support strategies to class
Need for Structured Environment	Stability and repetition improve adaptation	Maintain consistent classroom routines and spatial organization

Positive Developmental Outcomes	Inclusion improves independence, empathy, and social skills	Encourage collaborative learning and inclusive participation

Another notable behavioral pattern is the tendency toward withdrawal or self-isolation. This may manifest physically—through the use of designated quiet spaces—or psychologically, as the child becomes internally focused during lessons. In some cases, repetitive or self-stimulatory behaviors (often referred to as "blindisms") may emerge. Such behaviors can serve as mechanisms for processing information or coping with excessive environmental demands. However, they are often misinterpreted by peers as disinterest in communication or participation, which may negatively affect social relationships (Kef, 2002).

During unstructured times, such as breaks, blind children may unintentionally disrupt peer interactions. For instance, a child may approach a group engaged in a shared activity (e.g., watching content on a device) under the pretext of asking a simple question, while actually seeking social inclusion. Without appropriate pedagogical mediation, such situations may lead to exclusion, with the blind child quickly assuming the role of an outsider within the peer group (Avramidis & Norwich, 2002).

The need for assistance from teachers or peers is another defining feature of inclusive learning for blind children. While such support is essential, it may create perceptions among sighted students that the blind child occupies a privileged or "special" position, receiving disproportionate attention. This perception can become a source of tension within the classroom if not carefully managed (Ainscow, 2020).

To facilitate participation in collective activities, teachers often need to provide continuous verbal guidance to the blind child. While this is pedagogically necessary, it may further reinforce the perception of difference among peers. Parents of blind children frequently express concern about excessive adult intervention, particularly when teaching assistants lack specialized training in visual impairment. In some cases, inappropriate support practices may even hinder the child's previously developed independence and skills, underscoring the importance of professional competence in inclusive support roles (Hewett et al., 2017; UNESCO, 2020).

Observational evidence suggests two contrasting behavioral patterns commonly exhibited by blind children. The first can be described as "behavioral staticity," where the child remains in a fixed location for extended periods, showing reluctance to engage in dynamic group activities. This behavior is often perceived by peers as rigidity or social withdrawal. The second pattern, in contrast, involves continuous movement or "restless wandering," driven by anxiety related to spatial orientation and environmental uncertainty. This constant movement may disrupt classroom activities and lead to the perception of the child as inattentive or overly individualistic (Zebehazy & Smith, 2011).

From a cognitive perspective, blind children expend considerable mental energy on tasks that sighted children perform automatically. These include locating personal belongings, navigating physical spaces, recalling spatial routes, and processing auditory and tactile information. The cumulative cognitive load associated with these tasks can significantly reduce the child's available energy for academic activities, leading to fatigue even before formal learning tasks begin (World Health Organization, 2019).

The auditory environment of a typical classroom—often consisting of 25–30 students—further complicates orientation and concentration. While sound can serve as an important spatial cue, excessive or chaotic auditory input may instead create confusion and hinder effective navigation and focus. Experimental evidence suggests that, in complex auditory environments, blind individuals may experience increased cognitive strain, similar to sighted individuals attempting to navigate with their eyes closed in noisy settings (McLinden et al., 2016).

These challenges also extend to social participation in play. In group or role-playing activities, blind children may initially assume passive roles due to slower response times and difficulties in interpreting rapidly changing social cues. As a result, they may be perceived as less capable partners in play, which can reinforce patterns of social exclusion if not actively addressed by educators (Florian, 2019).

A strong need for physical or emotional proximity to the teacher is another characteristic frequently observed, particularly during the early stages of school integration. This need reflects the child's desire for safety and security in an unfamiliar environment. Such attachment behaviors may include seeking physical contact, remaining close to the teacher, or relying on familiar objects brought from home. While these strategies can support emotional stability, they may also evoke feelings of jealousy among sighted peers, who perceive unequal access to the teacher's attention (Kef, 2002).

Finally, communication patterns of blind children may differ significantly from those of sighted peers. For example, a blind child may approach others at very close distances, seek tactile contact (e.g., touching the face or holding hands), or grasp peers firmly during interaction. While such behaviors are functional and necessary for communication from the child's perspective, they may be perceived as intrusive or uncomfortable by sighted children, potentially leading to misunderstandings or conflicts (Douglas et al., 2019).

Pedagogical Challenges, Behavioral Responses, and Social Outcomes of Inclusion

A distinctive feature of the behavior of blind children in inclusive educational settings is their response to unexpected situations initiated by peers. In such circumstances, two primary types of reactions can typically be observed: **aggressive** and **passive** responses. These reactions often emerge when the child has not been adequately prepared for a change in activity, sequence of actions, or social interaction.

For example, if the structure of a lesson, game, or educational activity has not been clearly explained in advance, a blind child may respond negatively when peers attempt to guide or physically lead them into an unfamiliar situation. In the absence of prior verbal orientation and predictability, such interventions may be perceived as intrusive or threatening, leading either to resistance (aggression) or withdrawal (passivity) (McLinden et al., 2016; Douglas et al., 2019).

A fundamental developmental limitation associated with visual impairment is the reduced opportunity for **observational learning through visual imitation**. Unlike sighted children, blind children cannot rely on visual cues to understand and replicate actions. Without careful pedagogical guidance, this limitation may trigger a chain reaction of misunderstandings, potentially resulting in the blind child being perceived by peers as less competent or incapable (Hewett et al., 2017; Florian, 2019).

This dynamic can be illustrated in physical education contexts. When a blind child is unable to observe how a movement is performed, they may execute it incorrectly. The natural reactions of sighted peers—such as laughter or critical comments—can undermine the child's self-confidence and lead to feelings of embarrassment or inadequacy. As a consequence, the child may develop avoidance behaviors, including refusal to participate in future activities due to fear of negative social evaluation (Zebehazy & Smith, 2011).

The behavioral patterns described throughout this study highlight not only the challenges faced by blind children but also the critical points at which inclusion may falter. These "critical barriers" do not necessarily occur in every case, nor do they manifest uniformly across individuals. Each child's experience is unique, shaped by personal characteristics, environmental conditions, and the quality of pedagogical support. Nevertheless, these challenges can be mitigated, circumvented, or significantly reduced through thoughtful and responsive educational practices (Ainscow, 2020; UNESCO, 2020).

Central to overcoming these barriers is the teacher's capacity to deeply understand the specific dynamics of a classroom that includes a blind child. Professional competence, pedagogical intuition, patience, and a high level of personal commitment are essential in fostering a positive and inclusive classroom climate. In such an environment, conflicts are not ignored but are addressed constructively, and each lived experience becomes an opportunity for learning and growth for all participants (Florian, 2019).

Mutual Benefits of Inclusive Education

While the initial focus of inclusion is often placed on the developmental benefits for the child with visual impairment, it is equally important to consider the positive outcomes for sighted peers. Through interaction with a blind child, sighted students learn to perceive the world through multiple sensory modalities, moving beyond a reliance on vision alone. This expanded sensory awareness contributes to cognitive flexibility and a deeper understanding of human diversity (UNICEF, 2021; World Health Organization, 2019).

Moreover, inclusion fosters the development of empathy, tolerance, and social sensitivity. Children learn to engage with peers who may initially appear "different" or "unfamiliar," gradually overcoming stereotypes and building authentic relationships. In shared activities—whether in play or learning—the significance of visual impairment often diminishes, allowing the blind child to be perceived not as "a child with a problem," but as an equal partner in interaction (Avramidis & Norwich, 2002).

Inclusive environments also promote genuine and unbiased communication. The interpersonal experiences gained during childhood have the potential to shape long-term attitudes, equipping individuals with social competencies that extend into adulthood. Such early exposure to diversity is widely recognized as a key factor in the development of inclusive societies (Ainscow, 2020; OECD, 2021).

Findings

The findings of this study are based on long-term pedagogical observations, professional experience, and reflective analysis of inclusive practices involving blind children in primary school settings. The results reveal several interrelated dimensions that characterize both the challenges and the developmental potential of inclusive education.

1. Temporal and Cognitive Demands of Learning

One of the most consistent findings is that blind children require significantly more time to engage in all forms of activity, including learning, communication, and play. This increased temporal demand is linked to the necessity of relying on non-visual sensory channels—primarily tactile and auditory perception—for understanding objects, instructions, and spatial relationships.

As a result, tasks that are performed automatically by sighted children often require deliberate cognitive effort from blind learners. This includes organizing materials, navigating the classroom, and interpreting instructions. Consequently, blind

children may experience cognitive fatigue earlier, which can affect their level of participation and task completion (McLinden et al., 2016; Douglas et al., 2019).

2. Behavioral Adaptation and Emotional Regulation

The study identifies distinct behavioral patterns that emerge as adaptive responses to the inclusive environment. In situations of uncertainty or insufficient preparation, blind children tend to exhibit either **passive withdrawal** or **active resistance**. These reactions are particularly evident when transitions between activities are not clearly explained or when the child is unexpectedly guided into unfamiliar situations.

Additionally, behaviors such as temporary withdrawal, repetitive actions, or increased verbalization were observed as coping mechanisms for managing sensory overload and processing information. These behaviors, while functional for the child, are often misinterpreted by peers as disinterest or non-cooperation (Florian, 2019; Zebehazy & Smith, 2011).

3. Limited Access to Observational Learning

A key developmental constraint identified in the findings is the absence of visual imitation. Blind children cannot rely on observational learning to acquire new skills, particularly in dynamic activities such as physical education or group tasks. Without explicit verbal instruction and guided demonstration, this limitation may result in incorrect task performance.

Such situations may trigger negative peer reactions, including ridicule or exclusion, which in turn affect the child's self-esteem and willingness to participate. In some cases, repeated negative experiences lead to avoidance behaviors, reducing the child's engagement in group activities (Hewett et al., 2017).

4. Social Interaction and Peer Relationships

The findings highlight the complexity of social interactions between blind and sighted children. Blind children often demonstrate a strong need for social contact but may use communication strategies—such as close physical proximity or tactile interaction—that differ from social norms among sighted peers. These differences can lead to misunderstandings, discomfort, or even conflict if not mediated by the teacher.

Moreover, the reliance of blind children on adult support may create perceptions among peers that they receive preferential treatment. This perception can negatively influence peer attitudes and group dynamics, particularly if not addressed through transparent communication and inclusive classroom practices (Avramidis & Norwich, 2002).

5. The Role of Predictability and Structured Environment

A stable and predictable classroom environment was found to be a critical factor in supporting the adaptation of blind children. Repetition of routines, consistency in expectations, and clear verbal guidance contribute significantly to the child's sense of security and confidence.

The findings indicate that blind children initially invest considerable time and energy in exploring and understanding the physical environment. Only after achieving spatial familiarity are they able to fully engage in academic and social activities. This underscores the importance of allowing sufficient time for orientation and gradual adaptation (McLinden et al., 2016).

6. Importance of Pedagogical Support and Collaboration

The study confirms that effective inclusion is strongly dependent on the quality of pedagogical support and collaboration between stakeholders. Teachers who demonstrate flexibility, creativity, and reflective practice are more successful in managing inclusive classrooms.

Support from Inclusive Resource Centers (IRCs), including консультации, classroom observations, and joint problem-solving, significantly enhances teacher competence and confidence. Furthermore, collaboration between teachers, parents, and support specialists—the so-called "collaborative triangle"—emerges as a key determinant of successful inclusion (OECD, 2021; UNESCO, 2020).

7. Positive Developmental Outcomes

Despite the identified challenges, the findings clearly indicate that inclusive education yields substantial benefits for both blind and sighted children. Blind children develop greater independence, social competence, and self-confidence through participation in a mainstream environment.

At the same time, sighted children demonstrate increased empathy, tolerance, and social awareness. Over time, initial barriers and fears tend to diminish, giving way to more natural and equal interactions. In successful cases, the focus shifts from the child's impairment to their role as an active participant and peer within the classroom community (Ainscow, 2020).

Summary of Findings

Overall, the findings suggest that inclusion is a dynamic and context-dependent process that requires continuous adaptation. While blind children face specific cognitive, behavioral, and social challenges, these can be effectively mitigated through structured support, informed pedagogy, and collaborative effort.

Successful inclusion is characterized not by the absence of difficulties, but by the ability of educators and students to respond to these challenges constructively, transforming them into opportunities for learning and development.

A Three-Level Inclusive Adaptation Framework for Blind Children in Primary Education

Based on the empirical findings and long-term pedagogical observations presented in this study, a conceptual model—the Three-Level Inclusive Adaptation Framework for Blind Children—is proposed to systematize the key processes involved in successful inclusion.

This framework integrates cognitive, social, and institutional dimensions of inclusion and explains how blind children adapt to mainstream primary education environments through three interconnected levels: (1) Individual Adaptation, (2) Social Integration, and (3) Institutional Support.

Level 1: Individual Adaptation

The first level focuses on the internal processes of adaptation experienced by the blind child.

This includes:

- cognitive processing (tactile and auditory perception),
- spatial orientation and mobility,
- emotional regulation and sense of security,
- behavioral responses to uncertainty.

At this level, adaptation is characterized by:

- increased time requirements,
- high cognitive load,
- reliance on structured routines,
- and the need for predictability.

The findings of this study confirm that successful inclusion begins with the child's ability to develop a stable internal framework for interacting with the environment (McLinden et al., 2016; Douglas et al., 2019).

Level 2: Social Integration

The second level involves the child's interaction with peers and participation in the social life of the classroom.

Key components include:

- communication patterns,
- peer relationships,
- participation in group activities,
- and the development of social identity.

At this level, challenges arise from:

- differences in communication styles,
- absence of visual imitation,
- and potential misinterpretation by sighted peers.

However, with appropriate pedagogical mediation, this level leads to:

- increased empathy among peers,
- normalization of differences,
- and the transformation of the blind child from an "outsider" to an equal participant (Avramidis & Norwich, 2002; Kef, 2002).

Level 3: Institutional Support

The third level encompasses the broader educational system and support mechanisms that enable inclusion.

This includes:

- teacher competence and flexibility,
- collaboration between school, parents, and Inclusive Resource Centers (IRCs),
- availability of support personnel,
- and adaptive learning environments.

This level is conceptualized as a "collaborative triangle":

School – Family – IRC

The effectiveness of this level determines whether inclusion remains formal or becomes meaningful and sustainable (OECD, 2021; UNESCO, 2020).

Dynamic Interaction Between Levels

A key feature of the proposed framework is the dynamic interaction between all three levels.

- Weakness at one level (e.g., lack of teacher support) negatively affects the others.
- Strong coordination leads to successful inclusion and positive developmental outcomes.

Thus, inclusion is not a static condition but a continuous, adaptive process requiring balance across all levels.

Implications of the Model

The proposed framework has both theoretical and practical significance:

Theoretical Contribution:

- Provides a structured understanding of inclusion as a multi-level process
- Integrates behavioral, cognitive, and institutional perspectives

Practical Application:

- Can be used by teachers to assess classroom readiness
- Helps IRC specialists design targeted interventions
- Supports policymakers in developing inclusive education strategies

Conclusion

The inclusion of blind children in primary education represents a complex and dynamic process that extends beyond organizational arrangements and into the core of pedagogical practice and social interaction. As demonstrated in this study, successful inclusion depends on a combination of carefully structured conditions, collaborative support systems, and a deep understanding of the behavioral and developmental characteristics of visually impaired learners.

Blind children encounter specific challenges related to sensory processing, spatial orientation, and social communication, which require additional time, targeted support, and adaptive teaching strategies. At the same time, these challenges can be effectively addressed through informed pedagogical approaches, flexible classroom organization, and strong cooperation between teachers, parents, and specialized professionals.

A central finding of this study is that inclusion is not a static state but a continuous process of adjustment, learning, and mutual transformation. Teachers play a pivotal role in this process, as their professional competence, sensitivity, and willingness to adapt directly influence the quality of inclusion. Equally important is the role of Inclusive Resource Centers, which provide essential guidance, coordination, and support.

Importantly, the benefits of inclusion extend beyond the individual child with visual impairment. Sighted students gain valuable social and emotional competencies, including empathy, tolerance, and the ability to interact with diverse individuals. These experiences contribute to the formation of inclusive attitudes that may persist into adulthood.

Based on practical experience and research evidence, it can be concluded that initial difficulties and uncertainties associated with inclusion tend to diminish over time, giving way to positive outcomes for all participants. Inclusive education, when implemented thoughtfully and systematically, becomes not only an educational model but also a powerful instrument for social integration and human development.

In this regard, primary school serves as a foundational environment where the principles of inclusion can be realized in practice, shaping both individual life trajectories and broader societal values.

Ethical Approval

This study is based on professional pedagogical experience, observational analysis, and reflective practice in inclusive educational settings. The research does not involve experimental procedures, medical interventions, or the collection of sensitive personal data. All observations were conducted in accordance with ethical standards for educational research, ensuring respect for the dignity, privacy, and rights of all participants.

Where applicable, the study adheres to the principles outlined in the Declaration of Helsinki and international guidelines for research involving human participants.

Informed Consent

No identifiable personal data are included in this study. All examples and observations are presented in a generalized and anonymized form. Therefore, formal written informed consent was not required. Nevertheless, all ethical considerations regarding confidentiality and respect for participants have been strictly observed.

Conflict of Interest

The author declares that there are no conflicts of interest regarding the publication of this article. The research was conducted independently, without any financial or commercial influence that could be perceived as a potential conflict.

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Author Contributions

The author confirms sole responsibility for all aspects of the study, including conceptualization, data interpretation, writing, and final approval of the manuscript.

Data Availability Statement

No datasets were generated or analyzed during the current study. The article is based on qualitative observations and professional experience. Any additional information can be made available by the author upon reasonable request.

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The author acknowledges the use of AI-assisted tools (including ChatGPT) for linguistic editing, translation, and refinement of the manuscript. All intellectual content, interpretations, and conclusions remain the sole responsibility of the author. The use of AI tools complies with current academic publishing standards and ethical guidelines.

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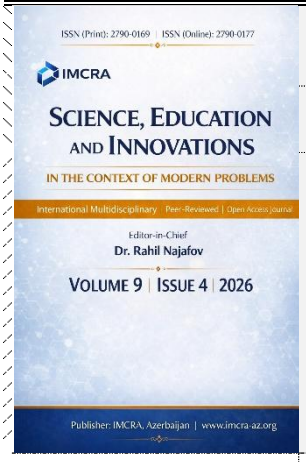
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RESEARCH ARTICLE

Algeria's Strategic Response to Emerging Security Threats in the Maghreb and African Sahel: A Geopolitical and Multidimensional Analysis of Terrorism, Organized Crime, and Irregular Migration

Zouiouche Houssam Eddine
Dr.
University of Continuing Education – Sétif
Algeria
Email: zouiouchehou@gmail.com

Keywords
Algerian national security; counterterrorism strategy; Maghreb geopolitics; African Sahel security; organized crime networks; irregular migration; regional instability; cross-border threats; security policy; North Africa

Abstract
This study examines Algeria's strategic approach to confronting evolving security threats arising from instability in the Maghreb region and the African Sahel. In recent decades, regional geopolitical transformations—particularly following the Arab Spring and the collapse of state structures in neighboring countries such as Libya and Mali—have generated complex and interconnected security challenges. These include the proliferation of cross-border terrorism, the expansion of organized criminal networks, the illicit arms trade, and increasing patterns of irregular migration. The research adopts a geopolitical and security-oriented analytical framework to explore how Algeria, as a key regional actor with significant geostrategic importance, has adapted its national security doctrine to respond to these multidimensional threats. The study highlights the interaction between internal and external security environments, demonstrating how regional instability has directly influenced Algeria's domestic security dynamics. Particular attention is given to the resurgence of terrorist activities facilitated by the circulation of weapons and fighters across porous borders, as well as the growing nexus between terrorism and organized crime. Furthermore, the paper analyzes Algeria's comprehensive security strategy, which integrates military preparedness, intelligence coordination, border control reinforcement, and international cooperation mechanisms. It also emphasizes the country's efforts to balance hard security measures with preventive approaches, including socio-economic development and counter-extremism initiatives. The findings suggest that Algeria's adaptive and multidimensional security policy reflects a pragmatic response to an increasingly complex regional threat landscape, positioning the country as a pivotal actor in maintaining stability in North Africa and the Sahel.

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Introduction:

The Maghreb region and the African Sahel are considered a fertile ground for the growth of new security threats, in addition to the worsening of internal crises, as a result of the fragility of their states after the successive events they witnessed, represented mainly in what is known as the Arab Spring and the extent of its impact on the State of Libya, which became a

headquarters for many armed groups, and the unstable environment in Mali also contributed to the aggravation of these phenomena and their spread beyond its regional borders.

The Maghreb region and the African Sahel have lately constituted a focus of international and regional interest, in view of the various security threats they are witnessing, among them the traditional ones rooted in the states of these areas, and among them the new threats whose emergence and aggravation were contributed to by the first type, as a result of the fragile social nature, economic weakness, and political failure, and this directly affected the neighboring states, especially Algeria, through the transmission of their contagion, and by bringing international powers into the region, which called for the setting of policies and strategies to confront and counter the threats and challenges known by these areas, and to work on finding the necessary solutions in order to contain them and prevent their spread.

Within the framework of confronting the new forms of security threats, the importance of Algeria's security policy emerges, since it is a state concerned with repelling the dangers of those threats, and with defining the challenges, risks, and the appropriate tools to confront them, on the basis that it represents the totality of opinions, beliefs, and principles that form the intellectual structure of Algerian security, and it adopts that strategy which is considered an entry point for it in its handling of the issues and challenges facing it, and it is also considered the basis for the interpretation and understanding of all matters of a security nature .(Yaacoub and Bakhchich, 2022, p. 1332)

Methodology

This study adopts a qualitative, analytical, and multidisciplinary research approach to examine Algeria's strategic response to emerging security threats in the Maghreb and African Sahel regions. Given the complex and transnational nature of the phenomena under investigation—namely terrorism, organized crime, and irregular migration—a geopolitical and security-oriented analytical framework was employed.

The research is based primarily on secondary data sources, including academic literature, peer-reviewed journal articles, policy reports, governmental publications, and international organization documents (e.g., United Nations reports, Global Organized Crime Index). These sources were selected to ensure reliability, relevance, and comprehensive coverage of regional security dynamics.

A thematic analysis method was utilized to categorize and interpret the data according to three principal analytical axes: (1) counterterrorism strategy, (2) organized crime and transnational criminal networks, and (3) irregular migration and border security. This structure enabled a systematic examination of Algeria's multidimensional security policy and its interaction with both internal and external threat environments.

Furthermore, the study applies a geopolitical analytical lens, emphasizing the role of spatial dynamics, border vulnerabilities, and regional instability in shaping Algeria's national security doctrine. Particular attention is given to the interdependence between domestic security policies and broader regional developments, especially in post-Arab Spring contexts.

To enhance analytical depth, the research also incorporates a comparative contextual perspective, examining Algeria's strategies in relation to regional trends and international counterterrorism and security frameworks. This allows for a more nuanced understanding of Algeria's position as a key stabilizing actor in North Africa and the Sahel.

Despite its comprehensive scope, the study acknowledges certain limitations. The reliance on secondary data may restrict access to real-time or field-based insights, and the rapidly evolving security landscape in the region may affect the long-term applicability of some findings. Nevertheless, the methodological approach ensures a coherent and robust analysis of Algeria's strategic responses within a complex geopolitical environment.

The First Axis: Algeria's Strategy in Combating Terrorism

Algeria is considered among the most prominent states that suffered from the terrorist phenomenon, especially during the period of the nineties of the twentieth century, and despite its reduction and recession in recent years and the decline of terrorist operations in Algeria, it still constitutes a threat to Algeria's security through the emergence of new patterns and forms of it, due to the internal conflicts suffered by neighboring states, especially Libya and Mali, and the exploitation by terrorist groups of the situation to activate and carry out terrorist operations, after obtaining weapons and fighters .(Amrani and Zeroual, 2014, p. 112)

The imposition by the Azawad Movement of its control over the northern Mali region is considered a motive for the Malian central government to request the international community to intervene on the grounds that the movement has a close connection with terrorism, and this was embodied through the French military intervention, which carried out a set of attacks on the strongholds of the armed groups in northern Mali, which caused their dispersal, yet what is known as the Arab Spring and the collapse it left in Libya was followed by the re-emergence and aggravation of the terrorist phenomenon anew in the Maghreb region and the African Sahel, and these regions were taken by the terrorist groups as a stronghold for them.

Within its plans, the terrorist organization ISIS sought, through laying down a strategy for invading Algeria, by abolishing the borders between the different Islamic states, and establishing the Greater Islamic Caliphate, as well as confronting Shiism according to what the organization claims, and this organization is considered the most dangerous threat to the region after its control over important oil sites in Libya, and it became closer to Algeria, which pushed the Chief of Staff of the People's National Army to urge the army in June 2015 to prepare for any plan that strikes the country . (Kouachi, 2016, pp. 459-460)

Although the leader of al-Qaeda in the Islamic Maghreb, Abdelmalek Droukdel, refused to pledge allegiance to ISIS and join its ranks for reasons related to leadership, many cadres of the organization decided to join it, and with Boko Haram, which is active in Nigeria, declaring its support for the organization, the terrorist organization al-Mourabitoun, headed by the Algerian Mokhtar Belmokhtar, active in the Sahel region, acknowledged its pledge of allegiance to ISIS, and its pursuit of annexing other terrorist groups to the organization with the aim of controlling Africa, especially in light of the extension of ISIS into Libya, and most of the terrorist groups were concentrated in the Malian-Mauritanian border areas, in northern Mali, northern Chad, and in the Libyan-Algerian border areas .(Netari, 2015, p. 63)

Algeria sought to adopt innovative methods in combating the new terrorist phenomenon centered in the African Sahel and the Maghreb region, according to a strategy that combines long-term preventive measures and immediate measures that require confronting imminent terrorism directly threatening its national security. At the internal level, Algeria focused on its southern and eastern borders, without neglecting the northern region, such that the security services are waging a secret war against terrorists, by pursuing a group of activists on social media sites, who publish materials promoting the Islamic State, and the security services fear that ISIS supporters through social media sites may turn into sleeper cells that represent a real threat to Algerian security, and cyber security comes at the core of the security strategy in combating terrorism, through reinforcing the electronic security services with technical and human support, which track the sources of messages threatening to carry out terrorist operations that disturb security and terrify citizens, especially after the disappearance of the organization Jund al-Khilafah, and its replacement by the Algeria Province, whose members threatened military institutions with revenge for the operations carried out by the army against the fading of the terrorist groups stationed in the Algerian mountains and its desert .(Kouachi, 2016, p. 461)

Algeria also relied, within the framework of its fight against terrorism, on the process of gathering intelligence information, which is considered an integral part of the operations and policies of the war on terrorism and confronting it, and the effectiveness of information gathering is based to a large extent on the continuous coordination between the army, the police, and the judicial agencies concerned with law enforcement, and in view of the threats represented by the terrorist groups to Algeria, it strengthened international cooperation in combating terrorism, and thus acquired deep knowledge in the field of dealing with terrorist networks locally and internationally .(Ghrib, 2016)

The Algerian army forces also followed a strategy based on the wide deployment of forces at the level of the borders, and the army command had prepared massive equipment, along with the mobilization of 50,000 soldiers in December 2014 to cover the south-eastern borders, in order to prevent them from being subjected to attacks by terrorist groups.

The security and military forces tightened the procedures at the main entrances, government institutions, and sensitive sites, and they also tightened the guarding at the level of consular and diplomatic headquarters, and inspection and monitoring points were intensified, and many security surveillance cameras were installed, in avoidance of any possible threat. Algeria also took strict measures with regard to travelers coming from conflict zones, which include extremist groups, and intensified its monitoring of citizens heading to them, because of its fear that some of them may be affected by extremist ideas and join these groups, and the risks that may result from that in the event of their return, in addition to the training of imams to enlighten the thinking of young people with the true values of religion in order to protect them from being imbued with extremist ideas . (Kouachi, 2016, p. 463)

Algeria has initiated the equipping of airports, ports, and border crossings with very advanced capabilities to detect any attempt to introduce weapons and materials used in the manufacture of explosives, and to reinforce them with qualified human elements to fulfill the purpose, and the security services also distribute lists containing the names and pictures of persons pursued in security matters to the local security districts, in parallel with the intensification of investigations to dismantle sleeper cells and the support and backing networks of terrorist groups. Periodic meetings and gatherings are also held for the leaders of the security services, through which security plans are laid down to confront the terrorist phenomenon and everything that may affect national security, based on the experience acquired in fighting terrorism in the nineties of the last century, and thus gaining self-confidence in confronting the new security threats, foremost among them terrorism .(Kouachi, 2016, p. 464)

The lack of security stability on Algeria's southern and eastern borders has deepened the terrorist threat and the rest of the non-patterned threats, such as terrorism, and the alliance that brought together terrorist groups with smuggling groups also constituted a great danger at the local and regional level. Being aware that the terrorist phenomenon cannot be fought

individually, Algeria had to adopt a strategy based on a multilateral approach at the external level, in parallel with the internal measures that were addressed. At the level of the neighboring Arab states, there were bilateral arrangements between it and Libya and Tunisia, through cooperation with Libya in the field of rebuilding the Libyan forces and their security apparatuses, where during the meeting held in Cairo on 05 June 2015, in the presence of Algeria, Tunisia, Libya, and Egypt, agreement was reached to support the Libyan army forces with equipment, ammunition, and intelligence information to confront the terrorist organization ISIS, while refusing to deal with the militias, whereas coordination was carried out with Tunisia on the eastern border, without the participation of the Libyan militias, and this mechanism allowed Algeria to follow up the anti-terrorism policies in the countries of the neighboring states within a multilateral framework without that constituting a contradiction with the principle of non-intervention, and considering it as a successful model in both the social and economic curve of combating terrorism and the policy of non-intervention .(Ghrib, 2016)

To reinforce the efforts exerted in combating terrorism, initiatives of a regional character were adopted at the level of the African Sahel, through defining a common vision based on operational regional cooperation, supported by a shared political will among the field states in the African Sahel (Algeria, Mauritania, Mali, Niger), in order to protect the common borders from terrorist threats, and in order to dry up the sources of financing terrorist organizations, Algeria initiated a proposal to criminalize ransom for terrorist groups, and to punish the states that pay it, at the meeting of the Arab Ministers of Justice in Jeddah, Saudi Arabia, in 2015 .(Sahel, 2015, p. 621)

Mauritania also hosted, on 09 May 2022, a meeting of the Chiefs of Staff of the field states of Algeria, Mauritania, Niger, and Mali, which was founded in the city of Tamanrasset in southern Algeria in 2010, and aims at fighting terrorism and organized crime. The meeting included the Joint Operational Staff Committee of the Council of Chiefs of Staff of the member states, and this coincided with the security developments in the African Sahel states, and the reorganization by the terrorist Islamic State in Libya of its ranks. This meeting is considered an opportunity to study and assess the security situation in the Sahel, and to exchange the analyses drawn since the meeting held on 28 October 2016 in the Malian capital Bamako for the Chiefs of Staff, and the principal objective of the initiative remains the fight against terrorism in the Maghreb region and the Sahel, which are witnessing major security disturbances, especially after security investigations confirmed the existence of a link between arms smuggling activity and terrorism in northern Mali and Libya . (Saudi Press Agency, 2022)

Algeria is considered a leading state in the field of combating terrorism by international testimony, through its adoption of methods and ways that proved their effectiveness by drawing a security strategy that combines the military approach and the peaceful approach through uprooting the causes of extremism such as achieving economic and social development, and building conceptions that include the principle of moderation and fighting all extremist ideas through activating an integrated strategy that has become a subject of interest for states in the world, through the demand that states suffering from the phenomenon of terrorism benefit from its successful experience.

The Second Axis: Algeria's Strategy in Combating Organized Crime and Related Criminal Activities

The incapacity of the Libyan state in the Maghreb region, and of the Malian state in the African Sahel, to perform their functions formed a fertile ground for criminal groups that secure for them the protection and the effectiveness necessary for their activity, and these areas are considered a suitable theatre in which all kinds of organized crime have interacted, from money laundering, smuggling of drugs and trafficking in weapons, all the way to human trafficking, especially after the events of the Arab Spring and the crisis in northern Mali.

The European Union's group for combating drugs and organized crime defines it as a group composed of two or more persons, practicing a criminal enterprise that involves the commission of serious crimes for a long or indefinite period, in which each member has specific tasks within the framework of the criminal organization that aims to achieve profits by illegal ways, and it uses commercial activities, violence and other means of intimidation, and exercises influence over political and media circles, the public administration, judicial bodies, and the economy . (Kamel, 2001, p. 54)

The forms and patterns of organized crime are multiple, as they include illicit trafficking in drugs, which constitutes a global problem with major effects on human society, and the costs of combating it, raising awareness of its dangers, and treating its addicts are very high, estimated at 120 billion dollars. As for human trafficking, it is carried out through recruiting persons and transporting them for the purpose of exploiting them and obtaining suspicious financial gains, through practices similar to slavery and enslavement, and the removal of their organs. The crime of money laundering also constitutes one of the forms of organized crime, and it is carried out through transferring funds obtained from criminal activities in an illegal way by concealing their source to avoid legal responsibility, and the volume of money laundered in the world is estimated between half a trillion and three trillion dollars annually from the gross domestic product .(Rassouli, 2018, p. 161)

The Maghreb region and the African Sahel region are considered ideal for arms trade in a way that feeds criminal networks active in smuggling and even terrorist groups, and this phenomenon intensified after the Libyan crisis and the return of fighters who fought alongside the Gaddafi regime heavily armed with weapons. The United Nations, represented by its office

concerned with drugs and organized crime, estimated that the smuggling of cigarettes through the routes linked to these regions reached about 18% of the Algerian market, and 60% of the Libyan market, in addition to kidnapping cases and ransom demands such as the In Amenas incident 2013 (Lakher, 2012, p. 05), and before it the European hostages and Algerian diplomats in the Malian city of Gao.

Organized crime in its forms constitutes a real threat to Algerian security, especially in light of the lack of security coverage and the exposure of the southern and eastern borders, and its geographical proximity to areas of production and transit of drugs, and the aggravation of arms trade. In order to confront these threats, Algeria appended a set of measures in which regional coordination with the states of the region predominated. Algeria witnessed an active diplomatic movement in its geographical surroundings due to the nature of the security challenges surrounding it, and accordingly Algeria adopted a security conception based on the idea of comprehensive expanded security covering most political, economic, and social fields, and even cultural ones, especially in the field of combating terrorism and organized crime and criminalizing ransom .(Boumediene and Kassi, 2017, p. 137)

Within the framework of its multi-method strategy to combat organized crime and the crimes associated with it, Algeria participated in the United Nations Convention to combat terrorism and money laundering in 2006, and its joining the Global Forum to combat terrorism and organized crime, which is a multilateral mechanism launched in September 2011 in New York, and which includes 30 states and the United Nations and the European Union, and which aims to enhance cooperation and provide expertise and the necessary materials to combat these phenomena. Algeria co-chaired with Canada the working group in the Sahel, and Algeria also hosted meetings between the states of the region whether at the level of foreign ministers or chiefs of staff of the armies of Algeria, Mali, Mauritania, and Niger, Chad and Burkina Faso in March 2010, which was devoted to discussing terrorism and its alliance with organized crime in the region . (Rassouli, 2018, pp. 189-190)

According to the Algerian vision, achieving the stability of the population's condition requires securing decent living conditions, with the necessity of linking between sustainable development economically and socially, and political development related to the structure of regimes and the strengthening of democracy, through building the state of law and the institutions of good governance and respecting human rights. Algeria also aims to combat security threats at their source through achieving development, and this was embodied through its participation in the donors' conference for the development of Mali in Brussels on 15 May 2013, with the participation of 45 delegations of ministers and officials from Mali and Libya, in addition to the World Bank and the African Development Bank .(Rassouli, 2018, p. 191)

At the local level, Algeria has created a new security apparatus to combat organized crime in its national and international dimension, in accordance with the content of the international and regional agreements, and the Algerian Minister of Interior considered, during his supervision of the inauguration of the Central Service for Combating Organized Crime, that this apparatus came to strengthen the structure of the security apparatus and to repel crime in all its forms and components, as criminal groups have become quite skillful in using modern technological means by exploiting cyberspace, to reach their objectives, targeting the economic resources of the state with the aim of weakening it.

The establishment of this service is within Algeria's strategy in combating organized crime in light of the worsening of the situation in both Libya and Mali and its exploitation by its elements to implement their plans, and this service aims to protect persons and the state's economy, through developing mechanisms of preventive and anticipatory action that contributes to providing a suitable security climate for building a strong economic system far from corrupt money, monopoly, and speculation, especially in light of the current challenges. This service also undertakes the task of investigations in cases of crime, terrorism, and subversive acts, and the investigation of all criminal activities and their judicial follow-up, and the creation of networks of agreements to facilitate cooperation in the field of combating organized crime, and coordination with security partners locally (Ultra Editorial Team, 2021), and based on these measures Algeria ranked 99th in criminal market scores, according to the Global Organized Crime Index for the year 2021, and the indicators were recorded according to the following table:

State	Criminal markets (average)	Human trafficking	Migrant smuggling	Arms trafficking
Algeria	4.65	4.5	6.5	5.0

Source: Global Organized Crime Index for the year 2021.

The instability faced by a number of African states such as Libya and Mali was an enabling factor for expanding organized crime activities, such that Algeria ranked 99th in the Global Organized Crime Index for the year 2021, with regard to the heroin trade, cocaine, cannabis trade, and the trade in synthetic drugs, according to the following recorded indicators:

State	Criminal markets (average)	Crimes related to non-renewable resources	Heroin trade	Cocaine trade	Cannabis trade	Synthetic drugs trade
Algeria	4.65	6.5	2.0	3.5	6.5	5.5

Source: Global Organized Crime Index for the year 2021.

The statistics included in the table indicate that the average of criminal markets in Algeria has a moderate impact, such that it recorded a crime score of 4.65, whereas the crimes related to non-renewable resources had a major impact, while the adopted security policy and the strategy pursued by Algeria in the field of combating organized crime, such as the heroin trade and the cocaine trade, had a slight impact, whereas the cannabis trade had a major impact with a score of 6.5, despite the continuation of Algerian efforts in fighting this phenomenon imported from Algeria's western side, while the trade in synthetic drugs has a moderate impact.

The same index also clarified the degree of resilience of Algeria, which reflects the existence of response, capacity, and effectiveness in confronting organized crime, and it assesses the Algerian capacity to confront organized crime according to the appropriate legal, political, and strategic frameworks to counter it, and it came according to the following indicators:

State	Resilience (average)	Political leadership and governance	Government transparency and accountability	International cooperation	National policies and laws	Judicial system and detention	Law enforcement
Algeria	4.63	4.5	4.0	5.0	6.0	4.0	6.0

Source: Global Organized Crime Index for the year 2021.

Algeria ranked 104th, within the classification by scores with regard to resilience in fighting organized crime, such that the average resilience was 4.63, which is considered sufficiently effective, according to the scores and justifications included in the table, such that the degree of political leadership and governance in Algeria was 4.5, and this is moderately effective. The same applies to the degree of transparency of the Algerian government and its accountability, which reached 4.0, whereas the field of international cooperation recorded a score of 5.0 based on the agreements signed in the same field, and the policies and national laws applied in the field of combating organized crime also recorded a score of 6.0, and are considered sufficiently effective, while the Algerian judicial system recorded a degree of moderate effectiveness with a score of 4.0, whereas law enforcement was sufficiently effective, with a score of 6.0, and through the indicators specified in the Global Organized Crime Index issued by the Global Initiative against Transnational Organized Crime, the major steps of Algeria in the field of combating organized crime become quite clear, through the policies and laws that Algeria adopted within the framework of a strategy of integrated features.

The Third Axis: Algeria's Strategy in Countering Illegal Migration.

The Arab Spring and the state of instability in the African Sahel were accompanied by a wave of legal and illegal migrations, for which Algeria represented a field of reception, as its border areas such as the Tamanrasset region witnessed a large influx of African migrants from the Sahel region, and the Illizi region also knew many migrants fleeing the war in Libya, and the lack of security in the African Sahel, in addition to difficult economic and environmental variables such as drought. Algeria is also characterized by geographical proximity and economic exchange between the states of these regions, and as a result of these conditions the flow of African migrants increased, such that tens of thousands of them settled in the Algerian desert as refugees in camps, and under the pressure of the increase in their numbers and their distribution across the regions of the country for settlement, the authorities took a set of measures to combat the phenomenon of illegal migration, by adopting a strategy based on fighting the networks of smuggling persons, and setting strict laws for the entry of foreigners into Algeria, especially since the growth of crime in its different forms worsened alongside it, and the spread of Africans in public places, roads, mosques while practicing begging, markets, and others, and accordingly Algeria sought to put in place a conception that limits this phenomenon .(Ahrich et al., 2021, p. 112)

The geographical location of Algeria is considered suitable for taking a set of routes for migrants toward it, and that is through the land roads neighboring Algeria, represented by Tunisia and Libya to the east, Mali and Niger to the south, Mauritania and Western Sahara in the south-west, and Morocco to the west, in addition to the coast of the territorial waters in the Mediterranean Sea, and it is observed that the entry of illegal migrants is multiple in routes according to the networks of human smugglers and passers . (Ahrich et al., 2021, p. 121)

Illegal migration of African migrants to Algeria takes place through stages, until reaching the north of the country, and these migrants have taken a group of areas in which they settled, such as the district of Qat' al-Wad in Tamanrasset, the district of Melika in Ghardaia, and Oued Derji in Maghnia, and these are points of residence while waiting to continue their path toward the north, and then to Europe through the Mediterranean Sea . (Atwat, n.d., p. 87)

A set of routes for illegal migration toward Algeria during the recent period can be identified, and three principal routes can be identified: the Mali-Algeria border route, which witnesses a wave of migrations from West African states starting from Bamako passing through Gao, and from there reaching Algeria through the city of Tinzaouatine passing through Timiaouine toward Tamanrasset, and Bordj Badji Mokhtar toward the city of Adrar. As for the second route, it is through the Niger border, from Ouagadougou and Niamey to join the city of Agadez, passing through In Guezzam and Djanet toward Tamanrasset and Illizi, and the largest flows are considered to come from the states of Central Africa. As for the third route, it is through Libya toward Algeria, coming from the Libyan city of Sabha to the city of Djanet, and from the Libyan city of Ghadames to the border city of Debdeb reaching Illizi, passing through In Amenas and Ouargla.

Algeria recorded a continuous rise in the number of illegal migrants beginning from the year 2016, such that the number of illegal migrants in Algeria in 2021 reached double the migrants in 2020, and this is clarified by the following table:

State	Number of illegal migrants arrested in Algeria for 2020	Number of illegal migrants arrested in Algeria for 2021	Difference
Algeria	5825	10889	5064

Source: Algerian Press Agency, dated 16 December 2021.

The Algerian government worked to adopt a strategy to confront the phenomenon of illegal migration, through a set of mechanisms centered on reconsidering its migration policy, especially since the matter is related to national security, in light of the consequences resulting from it in terms of crime and social scourges, for the protection of the homeland is among the priorities of the Algerian authorities, in the face of the challenge of the great influx of waves of illegal migration and the settlement of migrants in the major cities such as Tamanrasset and Adrar in the south, Algiers, Constantine, Oran, and Setif in the north. Thus, Algeria concluded a group of collective agreements with the Sahel states within the framework of the NEPAD organization, and individual ones such as cooperation agreements with Mali, and border control with Libya. It also worked to combat human smuggling networks and impose the maximum penalties on them, and to reinforce border monitoring with human resources and modern equipment that contribute to repelling this phenomenon threatening Algerian security .(Ahrich et al., 2021, p. 123)

Like the organizations and legislations adopted by the Algerian authorities in the field of combating the phenomenon of illegal migration, it adopted a set of assisting mechanisms to the legal arsenal, which are represented in:

- The establishment of a center for documentation and statistics on illegal migration flows under the Ministry of Interior and Local Communities, which aims to collect information on migration flows through the bodies concerned with statistics related to illegal migration, the Ministry of Foreign Affairs, the Ministry of Interior through its directorates such as the General Directorate of National Security, and the Ministry of National Defence through the statistics provided on illegal migration convoys.

- The deployment of security units **affiliated with** the General Directorate of National Security whose mission is to combat illegal migration across the national territory, by deporting arrested illegal migrants to their countries of origin, especially African nationals of various nationalities, particularly after the recording of large numbers of African illegal migrants in Algeria, and the keenness of the Algerian authorities to deal with them according to international frameworks and laws.

In his response to the oral question of the member of the Council of the Nation Hassani Saidi in 2016, regarding the growth of the phenomenon of illegal migration in Algeria and its threats to Algerian security, especially in light of the large influx of migrants from the African Sahel states, the Minister of Interior confirmed that the Algerian state has put in place a set of mechanisms to address it, from the source by providing assistance to African states for development, and these mechanisms also included the establishment of alert systems that take charge of all contagious diseases that threaten public health, along with strengthening coordination between the operational services, and giving strict instructions to the governors for the continuous follow-up of the phenomenon, and taking all measures against any illegal act. These measures come in parallel with partnership actions within the framework of international and regional organizations in order to implement public policies capable of conceiving sustainable solutions, especially since this file carries within it a humanitarian character that imposes optimal care for migrants, and the Minister of Interior also presented a set of statistics of deportation operations carried out by

Algeria based on the request of the Nigerien authorities, which concerned since 2014, 17016 nationals, among them 8998 men, 2359 women, and 5659 children, in addition to the voluntary deportation of 502 Chadian nationals, and 550 Malian nationals . (Bedoui, 2016)

Algeria also, since its signing of the Geneva Convention, proceeded to issue Decree No. 63-274 containing the Penal Code amended and supplemented by Law No. 09-01, which stipulated in its Article 175 bis 1 that, without prejudice to the other legislative provisions in force, any Algerian or resident foreigner who leaves in an illegal manner, while crossing land, sea, or air border posts, shall be punished by imprisonment from two months to six months and a fine from 20,000 DZD to 60,000 DZD, or one of the two penalties, by impersonating an identity or using forged documents or any other fraudulent means to evade compliance with the necessary official documents or the procedures required by the laws and regulations in force. The same law also addressed in its Part Five bis 2 the crime of smuggling migrants, by considering the smuggling of migrants as organizing the illegal exit from the national territory with the aim of obtaining a financial benefit or another benefit, a misdemeanor punishable by imprisonment from three years to five years and a fine from 300,000 DZD to 500,000 DZD, with its aggravation in the case of the legal circumstances specified in Articles 303 bis 1, reaching ten years and a fine of 200,000 DZD .(Yousfat and Ben Ettayebi, 2019, p. 344)

It can be said that the phenomenon of illegal migration is among the complex and difficult problems that directly affect host states, including Algeria, as its geographical location, its wide borders, and its adjacency to crisis states made it a destination for African nationals, and despite the measures taken to confront it, it still constitutes a major danger to Algerian society, due to the negative repercussions that appear in various aspects of life, whether health, social, or economic ... therefore Algeria must double efforts, update the legal arsenal, and strengthen the measures taken in the field of combating the phenomenon of illegal migration, in order to avoid the pessimistic scenario related to the phenomenon.

Conclusion:

The Maghreb region and the African Sahel constitute one of the most prominent geographical spaces that have come to arouse international interest after the events that the two regions witnessed and are still witnessing, as an inevitable result of what came to be termed the Arab Spring revolutions that swept away security in Libya and what accompanied that in terms of spread into the African Sahel region, especially the State of Mali, given the close connection between the two crises in the two countries, in addition to the effect of the repercussions resulting from them on their neighboring states, especially Algeria, and this is what was addressed during the study, and a set of conclusions was reached at the end of this study.

The study before us examined the limits of the space of Algerian security in the Maghreb and African circle and the relationship that binds them to one another, as Algerian security strikes deep into Maghreb and African security and extends into these two regions, and for this reason we find that the relation between the two variables is a relation of influence and being influenced. Algeria's location within different geostrategic extensions made its security more exposed to the threats coming from the Maghreb and Sahel region, for the difficulty of controlling the natural factors related to the geographical variable, and the weakness of the institutional structure and the limited capabilities of the neighboring states suffering from crises, granted room for terrorist groups and organized crime to penetrate into the Algerian depth in order to target its security, as happened in Tiguentourine where the oil base there was attacked by terrorist groups exploiting the open geographical space.

The dynamics and movements that affected the Maghreb and African Sahel regions cast their shadows over the states of the two regions, as they came to know a set of challenges and threats to their security, which even extended into the inside of the states, and Algeria is considered among the states adjacent to the two regions that were affected by the threats exported from the crisis states to their regional neighborhood, and the intensity of Algeria's being affected within its geographical two regions goes back to the vastness of its area and the breadth of its solid borders. This generated Algeria's connection with multiple spaces whose internal situations reflected upon the surrounding regional environment, and here we can conclude through the chapters of the study that Algeria's being affected is double: on the one hand, at the level of its national security, through which it became imbued with fear of the security challenges and the threats resulting together with them, and on the level of its security behavior through its being affected by the different interactions and events that the Maghreb and African Sahel regions have come to live through, and through which the strategic features of the Algerian security policy became clear and it came to deal with the movements within each one of the previous circles.

With regard to the Maghreb region, the prominent feature of its security actors is that they are of a statist nature, and accordingly its threats to Algerian security are predominantly of a hard military character, with the presence of some soft threats whose level does not rise to the former, neither in terms of the size of the affecting threat, nor in terms of the values and references of Algerian security, nor in terms of their position within its security concerns, and these threats to Algerian security can be summarized in the Maghreb security environment which witnesses a set of crises, foremost among them the Libyan crisis, which has only turned into a conflictual security structure with a hostile surrounding that directly affects Algerian

security. The future of the Libyan crisis, which has long fluctuated between escalation and military settlement, and between calmness and resorting to peaceful solutions, made the threats emerging from it take on a mutating character, which pushes Algeria to raise its defensive and even offensive capacities to confront these various threats, and also obliged it to engage with all its diplomatic weight in order to reach comprehensive solutions to the crisis emanating from the Libyan people themselves without intervention from external parties, whether regional or international.

The continuation of the Libyan crisis carries within it the continuation of threats with multiple dimensions and effects due to Libya's position and the absence of an institutional structure organizing the situation in Libya, such as the national army, security, and public institutions, and this pushed Algeria to seek to prepare a political climate that allows the crystallization of political ideas despite their different orientations, and that through a set of consultations that Algeria hosted and supported in a way that contributes to providing the necessary environment for forming the different configurations organizing the various institutions. Despite the repeated attempts of Algeria to call for reaching a peaceful solution to the Libyan crisis that guarantees Libyan security by the security institutions and the army, the observer of the Libyan situation is likely to see instability, which involves many challenges and threats regarding Algerian security, such as the flow of thousands of migrants onto Algerian territory displaced from Libya, and the Algerian economy bearing additional burdens because of these migrants, and also the internationalization of the Libyan conflict under the umbrella of the United Nations opens the way for major powers to intervene to preserve and expand their interests, which will make the Algerian state pay a high cost, through the support of rebels by Western powers seeking to achieve their interests in Libya, which makes the Libyan decision hostage to those powers, thus allowing them to control the shape of the Libyan regime and its way of managing foreign relations, especially with the regional surrounding.

In the face of the worsening and acceleration of the situation, this greatly contributed to raising the level of alertness in Algeria, as foreign intervention in the issues of the Maghreb regional area opened the way for expanding the activity of al-Qaeda in the Islamic Maghreb and North Africa by granting it justification for its jihadist activity hostile to the West. The atmosphere of chaos prevailing in Libya as a result of the civil war provides a suitable environment for the activity of these extremist groups, and by virtue of the shared borders between Algeria and Libya, Algeria considers what is happening in Libya a threat to its security, and to confront that it moves on two main levels. The first lies in a set of security measures in which the army, police, border guards, and gendarmerie are engaged, consisting in strengthening its geographical borders by transferring equipment and surveillance devices, and subjecting the movement of goods such as various spare parts across the border areas in order to prevent their smuggling to Libya. As for the second, it lies in strengthening cooperation and coordination with its neighboring states such as Mali, Niger, and Mauritania to combat terrorism and organized crime in general and the smuggling of weapons to Libya in particular. As for the conflicting parties, Algeria has maintained neutrality, with a firm rejection of any foreign intervention whatever the reason, and by virtue of proximity any support to any party against another would directly involve it in the conflict and expose its geographical territory to security risks, and its political position also expressed its political awareness, the content of which is that it will not be harmed in the event of supporting any party to the conflict.

Ethical Considerations

This study is based exclusively on secondary data, including academic literature, policy reports, and publicly available security analyses. No human participants, personal data, or confidential information were involved. Therefore, ethical approval was not required. The research was conducted in accordance with internationally recognized standards of academic integrity and ethical scholarship.

Declaration of Competing Interest

The author declares that there are no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Author Contributions

Dr. Zouiouche Houssam Eddine is the sole author of this study and was responsible for the conceptualization, data collection, analysis, interpretation, and writing of the manuscript.

Data Availability Statement

The data supporting the findings of this study are derived from publicly available sources, including academic publications, governmental reports, and international security analyses. No primary dataset was generated.

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Consent for Publication

Not applicable. This manuscript does not include any individual person's data in any form.

Research Limitations

This study is limited by its reliance on secondary data and qualitative analysis. The absence of primary empirical data, such as interviews with policymakers or field-based observations, may restrict the depth of contextual insights. Additionally, the rapidly evolving security environment in the Maghreb and Sahel regions may lead to changes that are not fully captured within the temporal scope of this research.

Implications of the Study

The findings of this study contribute to a deeper understanding of regional security dynamics in North Africa and the African Sahel. The research offers practical implications for policymakers by highlighting the importance of integrated security strategies that combine military, intelligence, and socio-economic approaches. It also underscores the necessity of regional cooperation frameworks in addressing transnational threats such as terrorism and organized crime.

Originality and Contribution

This study provides a comprehensive and multidimensional analysis of Algeria's security strategy within a complex regional context. Unlike previous studies that focus on isolated threats, this research integrates multiple dimensions—including terrorism, organized crime, and irregular migration—into a unified analytical framework. It contributes to the literature by emphasizing Algeria's role as a stabilizing regional actor and by highlighting the interdependence between internal and external security dynamics.

Future Research Directions

Future research could focus on empirical investigations involving fieldwork, interviews with security experts, and quantitative modeling of threat patterns in the Maghreb and Sahel regions. Additionally, comparative studies examining the security strategies of other regional actors could provide further insights into effective approaches for addressing transnational security challenges.

Practical Recommendations

Strengthening regional intelligence-sharing mechanisms among Maghreb and Sahel countries

Enhancing border security technologies and surveillance systems

Promoting socio-economic development programs to address root causes of extremism

Expanding international cooperation in counterterrorism and anti-organized crime initiatives

Developing integrated cybersecurity frameworks to combat digital extremism

Compliance with International Standards

This study adheres to internationally accepted academic and publication standards, including principles aligned with Committee on Publication Ethics and best practices for transparency, integrity, and responsible research conduct.

AI Use Statement

No artificial intelligence tools were used in the generation of the research content, analysis, or conclusions of this study. The manuscript reflects the independent scholarly work of the author.

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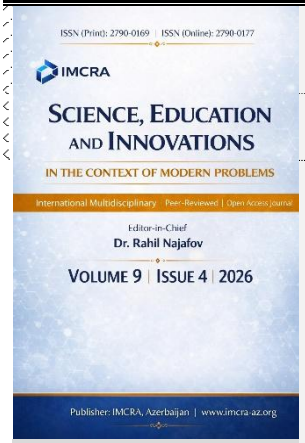
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RESEARCH ARTICLE

DGPA and Smart Phono-Memory: A Novel Theoretical Framework and Adaptive Digital Tool for Arabic Reading

Reggas Sarah
Scientific and Technical Research Center for the Development of the Arabic Language (CRSTDLA), Algiers
Algeria
Email: s.reggas@crstdla.dz

Lettad Kahina
Scientific and Technical Research Center for the Development of the Arabic Language (CRSTDLA), Algiers
Algeria
E-mail: k.lettad@crstdla.dz

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Arabic dyslexia; phonological awareness; working memory; diacritic processing; adaptive digital intervention; Smart Phono-Memory (SPM); Diacritic-Gated Phonological Access (DGPA)

Abstract
Developmental dyslexia in Arabic-speaking children presents unique challenges due to the structural and orthographic characteristics of the Arabic language, particularly the role of vowel diacritics in phonological decoding. Existing intervention models, primarily designed for Indo-European languages, often do not adequately account for these language-specific features. This study introduces *Smart Phono-Memory (SPM)*, an adaptive digital tool designed to support phonological processing through the integration of phonological awareness training, working memory activation, and controlled manipulation of vowelized and non-vowelized stimuli. In parallel, the study proposes the *Diacritic-Gated Phonological Access (DGPA)* model, which reconceptualizes diacritic processing as a central regulatory mechanism in Arabic reading. The proposed framework emphasizes the interaction between orthographic transparency and cognitive processing, highlighting how diacritic cues influence the stability of phonological representations. It further explores the relationship between phonological awareness and working memory as interdependent components in the decoding process. The adaptive nature of the SPM system allows for individualized progression, aligning task complexity with the learner's cognitive profile and reducing processing overload. In addition, the study situates Arabic reading within a broader cognitive-linguistic context, underscoring the importance of language-specific variables in literacy development. The integration of digital technology with theoretical modeling offers a novel perspective on intervention design, bridging the gap between cognitive theory and applied educational practice. The findings contribute to an emerging body of research advocating for culturally and linguistically responsive approaches in dyslexia intervention. By situating phonological processing within a language-specific cognitive framework, this work advances the theoretical understanding of Arabic reading acquisition and highlights the importance of adaptive, linguistically grounded digital interventions for addressing dyslexia in non-European orthographies.

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Introduction

Developmental dyslexia is a persistent neurodevelopmental disorder affecting approximately 5–10% of school-aged children worldwide and characterized by severe difficulties in accurate and fluent word recognition, spelling, and decoding despite adequate intelligence and adequate educational exposure (Peterson & Pennington, 2012; Snowling, 2000). Converging cognitive and neuropsychological evidence identifies deficits in phonological processing as the principal mechanism underlying reading difficulties in dyslexia (Vellutino et al., 2004).

Phonological awareness—the ability to analyze and manipulate speech sounds—is the strongest predictor of reading acquisition across alphabetic languages (Melby-Lervåg et al., 2012). Children with dyslexia show persistent impairments in phoneme segmentation, blending, and grapheme–phoneme correspondence, leading to unstable orthographic representations and poor decoding skills (Ehri, 2005; Snowling, 2013). These deficits are often compounded by limitations in verbal working memory, particularly in the phonological loop component described by Baddeley's multicomponent model, which supports temporary storage and rehearsal of phonological information (Baddeley, 2000; Gathercole & Alloway, 2008).

Evidence-based structured literacy interventions that explicitly train phonological skills and decoding processes significantly improve reading outcomes (National Reading Panel, 2000; Galuschka et al., 2014). However, working-memory training alone shows limited transfer to academic reading performance when not integrated into literacy instruction (Melby-Lervåg & Hulme, 2013; Sala & Gobet, 2017). These findings highlight the importance of integrated therapeutic approaches combining phonological training with cognitive scaffolding.

Recent advances in educational technology have enabled adaptive digital interventions capable of individualized pacing, immediate feedback, and increased learner motivation (Cheung & Slavin, 2013; Benavides-Varela et al., 2020). Yet most existing programs were designed for Indo-European languages and do not adequately account for the orthographic characteristics of Arabic, where vowel diacritics play a central role in phonological decoding.

Research on Arabic literacy shows that diacritics significantly facilitate word recognition and phonological decoding in early reading and in children with dyslexia, because they make phoneme–grapheme correspondences more transparent (Abu-Rabia & Taha, 2006; Taha & Saiegh-Haddad, 2017). Studies also demonstrate that removing diacritics increases cognitive load and working-memory demands during reading in Arabic (Saiegh-Haddad & Geva, 2008). These findings suggest that controlled manipulation of vowelization can serve as a therapeutic tool to strengthen phonological representations and decoding pathways.

Despite this evidence, few digital therapeutic programs have systematically integrated Arabic diacritics into adaptive phonological training combined with working-memory stimulation. Addressing this gap, the present study introduces Smart Phono-Memory (SPM), an adaptive digital therapeutic platform developed in Python for Arabic-speaking children with phonological dyslexia. The program integrates evidence-based phonological training with intelligent adaptive algorithms and interactive manipulation of vowelized and non-vowelized stimuli, aiming to reinforce grapheme–phoneme mapping while activating the phonological loop in working memory.

By combining structured literacy principles with Arabic-specific orthographic features and adaptive digital learning, SPM seeks to provide a culturally and linguistically appropriate intervention model capable of enhancing phonological awareness, working memory, and decoding skills in children with dyslexia.

Beyond its functional utility as a digital intervention, Smart Phono-Memory (SPM) serves as the empirical embodiment of a novel theoretical framework. This study moves from software implementation to theoretical conceptualization by proposing the Diacritic-Gated Phonological Access (DGPA) model. Within this framework, diacritic processing is redefined not as an auxiliary orthographic feature, but as a mandatory regulatory mechanism that gates phonological retrieval and stabilizes the grapheme-to-phoneme mapping in Arabic. Consequently, SPM acts as the clinical laboratory through which the DGPA model is validated, offering a paradigm shift from generic phonological training to a language-specific cognitive architecture tailored for the Arabic-speaking dyslexic brain.

Research Problem

Despite significant advances in evidence-based dyslexia interventions, many therapeutic programs remain insufficiently adapted to the linguistic characteristics of non-European orthographies. Most digital tools are designed for English or similar alphabetic systems and rarely account for the role of vowel diacritics in Arabic, which directly influence phonological decoding and reading accuracy (Abu-Rabia & Taha, 2006; Saiegh-Haddad & Geva, 2008). Consequently, Arabic-speaking children with phonological dyslexia often receive interventions that do not adequately address the specific interaction between phonological awareness, working memory, and orthographic transparency.

In addition, although phonological awareness training is widely recognized as effective, its impact is reduced when working-memory deficits are not simultaneously addressed (Swanson & Siegel, 2001; Melby-Lervåg & Hulme, 2013). Digital cognitive-training programs exist, but few integrate adaptive phonological exercises with controlled manipulation of vowelization to support grapheme–phoneme mapping in Arabic. This gap highlights the need for a scientifically grounded therapeutic platform capable of combining structured phonological training, working-memory activation, and Arabic-specific orthographic features within an adaptive digital environment.

Research Objectives

The present study aims to design and evaluate Smart Phono-Memory (SPM), an adaptive digital therapeutic program developed in Python to support Arabic-speaking children with phonological dyslexia. The first objective is to create a structured training environment that simultaneously stimulates phonological awareness and the phonological loop component of working memory through progressive and adaptive exercises.

A second objective is to examine the therapeutic value of interactive manipulation of Arabic diacritics within the program. By presenting letters, syllables, and words in both vowelized and non-vowelized forms, SPM seeks to reinforce grapheme–phoneme correspondences and facilitate decoding processes specific to Arabic orthography.

A third objective is to evaluate the procedural feasibility and motivational impact of the program during an exploratory pilot phase involving two clinical cases. This phase focuses on verifying the technical efficiency of the algorithm, the usability of the interface, and the qualitative therapeutic effects compared with traditional intervention approaches that were previously rejected by the children.

Research Questions

This study addresses the following research questions. First, can an adaptive digital therapeutic program such as Smart Phono-Memory effectively stimulate phonological awareness and working memory in Arabic-speaking children with phonological dyslexia? Second, does interactive manipulation of diacritics within digital stimuli improve phonological decoding and stability of phonological representations? Third, can a gamified and adaptive digital environment increase motivation and engagement compared with traditional therapy approaches?

Hypotheses

It is hypothesized that children using the Smart Phono-Memory program will show qualitative improvements in phonological awareness tasks and increased phonological working-memory span after the intervention period. It is also expected that vowelized stimuli will facilitate decoding accuracy more effectively than non-vowelized stimuli, particularly for children with deficits in phonological awareness. Finally, it is anticipated that the adaptive and gamified structure of SPM will enhance engagement and reduce avoidance behaviors observed in traditional therapy contexts.

Theoretical Framework

Literature Review

Cognitive and Neuropsychological Foundations of Developmental Dyslexia

Developmental dyslexia is conceptualized as a neurodevelopmental disorder primarily rooted in deficits in phonological processing rather than general intellectual impairment (Peterson & Pennington, 2012; Snowling, 2000). Longitudinal and experimental research has consistently demonstrated that difficulties in representing, accessing, and manipulating phonological units of language constitute the core cognitive marker of dyslexia (Vellutino et al., 2004). These phonological deficits compromise the establishment of stable grapheme–phoneme correspondences, leading to inaccurate decoding and reduced reading fluency.

Neurobiological investigations further support this perspective. Functional neuroimaging studies reveal underactivation in left temporo-parietal regions associated with phonological decoding and mapping processes in individuals with dyslexia (Shaywitz & Shaywitz, 2008; Dehaene, 2009). These findings align with the phonological deficit hypothesis, suggesting that reading difficulties emerge from inefficient neural processing within networks responsible for phonological analysis and orthographic integration.

Importantly, dyslexia is increasingly understood as a heterogeneous condition, with variability in cognitive profiles. Some children exhibit predominant phonological awareness deficits, while others show additional impairments in rapid naming or verbal working memory (Pennington, 2006). This variability underscores the need for adaptive interventions tailored to specific cognitive profiles rather than uniform remediation programs.

Phonological Awareness and Reading Acquisition

Phonological awareness—the ability to consciously manipulate speech sounds—has been identified as one of the strongest predictors of reading acquisition across alphabetic orthographies (Melby-Lervåg et al., 2012). Skills such as phoneme

segmentation, blending, deletion, and substitution are foundational for decoding unfamiliar words and developing orthographic representations (Ehri, 2005).

Ehri's phase theory of word reading development posits that children progress from pre-alphabetic to full alphabetic and consolidated alphabetic phases, during which grapheme–phoneme mapping becomes increasingly automated. Children with dyslexia often remain delayed in these phases due to unstable phonological representations (Ehri, 2005; Snowling, 2013).

Meta-analyses confirm that explicit and systematic phonics instruction significantly improves decoding skills, especially when combined with phoneme-awareness training (National Reading Panel, 2000; Galuschka et al., 2014). Structured literacy approaches emphasize cumulative, explicit instruction in sound–symbol relationships and have demonstrated robust evidence of effectiveness for learners with dyslexia (International Dyslexia Association, 2019).

However, phonological awareness alone does not fully explain reading performance. The efficiency with which phonological information is temporarily stored and manipulated also plays a crucial role, particularly when decoding multisyllabic words or maintaining sequences of phonemes.

Working Memory and the Phonological Loop

Baddeley's multicomponent model of working memory proposes a phonological loop responsible for short-term storage and rehearsal of verbal material (Baddeley, 2000). This subsystem supports the temporary maintenance of phonological information necessary for decoding, spelling, and sentence comprehension.

Research indicates that children with dyslexia frequently exhibit reduced phonological short-term memory span, which correlates with reading accuracy and spelling performance (Swanson & Siegel, 2001). Working memory limitations increase cognitive load during decoding, particularly when grapheme–phoneme correspondences are not automatized.

Despite theoretical links between working memory and reading, interventions focused solely on working-memory training have shown limited far-transfer effects to academic performance (Melby-Lervåg & Hulme, 2013; Sala & Gobet, 2017). Improvements often remain task-specific unless training is integrated within literacy-focused activities. These findings suggest that working memory should be stimulated within meaningful phonological contexts rather than through isolated cognitive drills.

Consequently, integrated interventions that simultaneously engage phonological awareness and phonological memory may offer greater ecological validity and stronger transfer to reading outcomes.

Orthographic Transparency and the Role of Diacritics in Arabic Reading

Arabic orthography presents distinctive characteristics that influence reading acquisition. While the consonantal script provides morphological cues, short vowels are typically represented through diacritics that clarify phonological information. When diacritics are present, orthographic transparency increases; when absent, readers must rely more heavily on lexical and contextual knowledge (Abu-Rabia & Taha, 2006).

Empirical studies demonstrate that vowelized text significantly improves decoding accuracy among beginning readers and children with dyslexia (Saiegh-Haddad & Geva, 2008). Diacritics facilitate grapheme–phoneme correspondence by making phonological information explicit, thereby reducing ambiguity during word recognition. Conversely, the absence of diacritics increases reliance on working memory and lexical retrieval processes.

Research also indicates that children with phonological dyslexia benefit from structured exposure to vowelized stimuli, as this strengthens phonemic representations and supports decoding fluency (Taha & Saiegh-Haddad, 2017). Importantly, diacritics can serve as a scaffold for phonological processing rather than merely an orthographic feature.

However, few digital interventions have systematically incorporated controlled manipulation of diacritics as a therapeutic variable. Most programs treat vowelization as a static feature rather than an adaptive tool capable of modulating task difficulty and cognitive load.

Digital and Adaptive Interventions in Dyslexia

Advances in educational technology have introduced computer-assisted interventions designed to enhance motivation, provide immediate feedback, and individualize pacing (Cheung & Slavin, 2013). Digital environments can increase engagement, particularly for children who exhibit resistance to traditional therapy formats.

Studies investigating technology-based interventions for reading disorders show moderate improvements in phonological processing and decoding accuracy (Benavides-Varela et al., 2020). Gamification elements, adaptive difficulty progression, and performance analytics contribute to sustained attention and practice intensity.

Neuroplasticity research suggests that repeated, targeted practice can strengthen neural circuits associated with reading (Shaywitz & Shaywitz, 2008). Digital platforms allow high-frequency repetition within structured frameworks aligned with evidence-based literacy principles.

Nevertheless, challenges remain. Many digital programs lack linguistic specificity, are not grounded in robust cognitive theory, or fail to integrate phonological training with working-memory activation. Additionally, empirical evidence regarding long-term generalization to classroom reading performance remains mixed (Hall et al., 2016).

While digital advancements offer promising avenues for dyslexia remediation, most existing platforms lack the linguistic specificity required for the Arabic orthographic context. There is an urgent need for a framework that transcends simple gamification by embedding language-specific variables into the core of the adaptive therapeutic training process. This necessity provides the scientific rationale for Smart Phono-Memory (SPM), conceptualized as an integrated therapeutic architecture designed to address the unique cognitive-linguistic profile of Arabic-speaking children with dyslexia.

The Rationale for Smart Phono-Memory (SPM)

The literature converges on three central principles: (1) phonological deficits are foundational in dyslexia; (2) working memory contributes to decoding efficiency; (3) Arabic diacritics significantly influence phonological transparency.

However, an integrated therapeutic model combining these elements within an adaptive digital environment remains underexplored. Smart Phono-Memory (SPM) was therefore conceptualized to bridge this gap. The program integrates structured phonological awareness exercises with activation of the phonological loop and dynamic manipulation of vowelized and non-vowelized stimuli. By adjusting task complexity according to user performance, SPM seeks to optimize cognitive load while reinforcing grapheme–phoneme mapping.

Grounded in cognitive theory, orthographic research, and principles of adaptive learning, SPM aims to offer a culturally and linguistically appropriate therapeutic framework for Arabic-speaking children with phonological dyslexia. The present exploratory study constitutes the initial developmental phase of this model.

Conceptual Model of Smart Phono-Memory (SPM)

The conceptual framework of Smart Phono-Memory (SPM) is grounded in cognitive models of developmental dyslexia that identify phonological processing deficits and limitations in verbal working memory as primary mechanisms underlying reading difficulties (Vellutino et al., 2004; Baddeley, 2000). The model assumes that effective remediation must simultaneously stimulate phonological awareness and the phonological loop while adapting task difficulty to the child's cognitive profile.

Within this framework, SPM is conceptualized as an adaptive therapeutic system integrating three core components: structured phonological training, working-memory activation, and controlled manipulation of Arabic diacritics. These components interact dynamically to reinforce grapheme–phoneme correspondences and stabilize phonological representations.

First, phonological-awareness exercises (segmentation, blending, and phoneme manipulation) aim to strengthen the accuracy of phonological representations, which are essential for decoding processes (Ehri, 2005). Second, timed stimulus presentation and recall tasks activate the phonological loop, enhancing temporary storage and rehearsal capacity in working memory (Gathercole & Alloway, 2008). Third, the interactive manipulation of vowelized and non-vowelized stimuli increases orthographic transparency and supports phoneme–grapheme mapping in Arabic reading (Abu-Rabia & Taha, 2006).

The adaptive algorithm serves as a mediating mechanism that adjusts task complexity according to the child's response patterns. By maintaining tasks within the "zone of optimal challenge," the program reduces frustration while maximizing cognitive engagement. Gamified feedback acts as a motivational moderator that enhances sustained attention and participation in therapy.

The expected outcome of this interaction is improved phonological awareness, increased phonological working-memory span, enhanced decoding accuracy, and greater motivation toward reading activities. These proximal gains are hypothesized to contribute to improved reading fluency and orthographic learning over time.

SEM Framework of SPM

The conceptual framework of Smart Phono-Memory (SPM) can be formalized as a structural equation model (SEM) in which the program exerts its effect on reading outcomes through mediating cognitive variables and moderated by motivational factors. The model integrates theoretical insights from phonological deficit theories, working-memory models, and Arabic orthographic research.

Variables of the SEM

Independent Variable (IV): SPM Intervention — the adaptive digital therapeutic program combining phonological training, working-memory activation, and interactive manipulation of Arabic diacritics.

Mediating Variables (MV): (1) Phonological Awareness: measured by tasks of phoneme segmentation, blending, and manipulation. (2) Phonological Working Memory: measured by span tasks, including recall of

letters, syllables, and short words presented in timed conditions.

Moderator Variable (ModV): Motivation/Engagement: operationalized as participation rates, time on task, and response to gamified feedback.

Dependent Variables (DV): (1) Decoding Accuracy: accuracy in reading vowelized and non-vowelized Arabic words and pseudo-words. (2) Phonological Representation Stability: operationalized as consistent correct recall across trials.

Hypothesized Paths

- SPM → Phonological Awareness: Structured phonological exercises directly improve awareness (Ehri, 2005; Melby-Lervåg et al., 2012).
- SPM → Working Memory: Timed exposure and recall tasks activate and strengthen the phonological loop (Baddeley, 2000; Swanson & Siegel, 2001).
- Phonological Awareness → Decoding Accuracy: Stronger phonological awareness predicts more accurate grapheme–phoneme mapping (Snowling, 2013).
- Working Memory → Decoding Accuracy: Higher span allows maintenance of phonological sequences during reading (Gathercole & Alloway, 2008).
- Motivation → Phonological Awareness & Working Memory: Motivation moderates the effectiveness of training through sustained attention and engagement (Benavides-Varela et al., 2020).
- Decoding Accuracy → Phonological Representation Stability: Accurate decoding reinforces stable mental representations of phonemes and words.
- Indirect Paths: SPM impacts reading outcomes indirectly via both mediators, with moderation by motivation.

Figure 1. Structural Equation Model (SEM) of the Smart Phono-Memory (SPM) intervention. The model illustrates direct effects of the adaptive digital program on phonological awareness and working memory, with motivation as a moderating variable, and indirect effects on decoding accuracy and phonological representation stability. IV: Intervention (SPM); MV: Mediators (Phonological Awareness, Working Memory); ModV: Motivation; DV: Reading outcomes (Decoding Accuracy, Phonological Stability).

Rationale for SEM

The SEM approach allows testing direct, indirect, and moderated effects of the SPM program. It quantifies how much phonological awareness and working memory mediate the impact of digital training on reading performance. It includes motivation as a moderator, reflecting real-world engagement differences. It aligns the theoretical model with empirical testing, supporting causal inferences even in pilot studies.

This framework sets the stage for future larger-sample studies and potential multigroup SEM analysis (e.g., comparing vowelized vs. non-vowelized stimuli) to quantify the contribution of linguistic features in Arabic reading development.

Methodology

Research Design

This study adopts an exploratory developmental research design, combining elements of case study analysis and design-based research (DBR). The primary objective is to develop, implement, and preliminarily evaluate the effectiveness of an adaptive digital therapeutic system—Smart Phono-Memory (SPM)—for Arabic-speaking children with phonological dyslexia.

Given the innovative nature of the intervention and the focus on system feasibility, usability, and initial cognitive outcomes, a pilot study framework was employed. This approach enables in-depth observation of individual cognitive processes while generating preliminary empirical evidence to inform future large-scale experimental research.

Participants

The study involved two children diagnosed with phonological dyslexia, selected through purposive sampling. Inclusion criteria were as follows:

- Clinical diagnosis of phonological dyslexia confirmed through standardized assessments
- Age range between 9 and 11 years
- Average intellectual functioning (as measured by Raven's Progressive Matrices)

- Absence of neurological disorders, sensory impairments, or intellectual disability

Participant Profiles

- Participant A (A.W.): 9 years 8 months; primary deficit in phonological working memory (limited span capacity)
- Participant B (R.L.): 10 years 6 months; primary deficit in phonological awareness, particularly in diacritic processing

Both participants had previously demonstrated low engagement with traditional intervention methods, making them suitable candidates for testing a digital, adaptive, and gamified therapeutic approach.

Ethical Considerations

The study adhered to established ethical standards for research involving human participants.

- Informed consent was obtained from parents/legal guardians
- Participants' identities were anonymized using coded identifiers
- The study complied with principles outlined in the Declaration of Helsinki
- Participation was voluntary, with the right to withdraw at any stage

Intervention Tool: Smart Phono-Memory (SPM)

Smart Phono-Memory (SPM) is a Python-based adaptive digital intervention system designed to simultaneously stimulate phonological awareness and activate the phonological loop in working memory.

Core Components:

1. Adaptive Algorithm
   Dynamically adjusts task difficulty based on real-time performance
2. Phonological Training Modules
   - Phoneme segmentation
   - Blending tasks
   - Phoneme manipulation exercises
3. Working Memory Activation
   - Timed stimulus presentation
   - Recall tasks requiring phonological retention
4. Diacritic Manipulation System
   - Presentation of stimuli in both vowelized and non-vowelized forms
   - Gradual increase in orthographic complexity
5. Gamification Features
   - Immediate feedback
   - Reward-based motivation (points, badges)
6. User Interface
   Developed using Python (Tkinter), ensuring accessibility and child-friendly interaction

Procedure

1. Baseline Assessment

Participants underwent pre-intervention evaluation using standardized and observational measures:

- Reading accuracy tests (vowelized and non-vowelized Arabic words)
- Phonological awareness tasks (segmentation, blending, manipulation)
- Working memory span tasks (letters, digits, and words)
- Cognitive assessment using Raven's Progressive Matrices

Behavioral observations (attention, motivation, anxiety) were also recorded.

2. Familiarization Phase

Participants were introduced to the SPM system through guided interaction sessions, including:

- Explanation of task objectives
- Demonstration of interface functionality
- Practice exercises to ensure operational understanding

3. Intervention Phase

Participants engaged in multiple individualized sessions using SPM. Each session followed a structured protocol:

- Presentation of stimuli (letters, syllables, words) for a controlled duration
- Automatic concealment of stimuli to activate phonological recall
- Immediate feedback provided after each response
- Adaptive adjustment of task complexity based on accuracy

Tasks progressed from simple phonological units (letters) to more complex structures (multi-syllabic words).

4. Data Collection

Data were collected using a mixed-method approach:

Quantitative Data:

- Accuracy rates (% correct responses)
- Reaction time (automatically logged)
- Performance progression across difficulty levels

Qualitative Data:

- Behavioral observations (engagement, persistence, frustration)
- Interaction patterns with the digital system

All quantitative data were recorded automatically through embedded Python logging functions.

5. Post-Intervention Assessment

Following the intervention phase, participants were reassessed using the same instruments as in the baseline phase to evaluate:

- Changes in phonological awareness
- Improvement in working memory span
- Gains in reading accuracy

Data Analysis

Given the exploratory nature and small sample size, analysis focused on descriptive and clinical significance measures:

- Descriptive statistics (pre–post comparison of accuracy scores)
- Effect size (Cohen's d) to estimate magnitude of change
- Reliable Change Index (RCI) to assess clinical significance

Qualitative observations were analyzed thematically to identify patterns in cognitive engagement, error types, and adaptive learning behavior.

Methodological Limitations

This study is subject to several limitations:

- Small sample size (n = 2), limiting generalizability
- Absence of a control group
- Short intervention duration
- Exploratory design without randomized assignment

Despite these limitations, the study provides valuable preliminary evidence regarding the feasibility and potential effectiveness of adaptive digital interventions tailored to Arabic orthographic features.

Materials: Smart Phono-Memory (SPM)

Smart Phono-Memory (SPM) is a Python-based adaptive digital program designed to stimulate phonological awareness and activate the phonological loop in working memory through interactive exercises. Key program components include:

- Adaptive algorithm: analyzes the child's responses and dynamically adjusts the difficulty of letters, syllables, and words to maintain an optimal cognitive challenge without causing frustration.
- Interactive diacritics manipulation: presents stimuli in vowelized and non-vowelized forms, supporting grapheme–phoneme mapping in Arabic.
- Phonological exercises: segmentation, blending, and recall tasks to enhance the phonological loop.
- Gamified feedback system: points and virtual badges to motivate participation and sustain attention.
- Graphical user interface: simple, child-friendly interface built using Tkinter, with timed exposure of stimuli and immediate feedback.

Additional materials included standardized assessment tools for phonological awareness, reading accuracy, and working-memory span; record sheets for qualitative observation of engagement and behavioral responses; and Python logging modules to automatically record response accuracy and reaction times.

Procedure

Baseline Assessment

Each participant underwent assessment of phonological awareness, working-memory span, and decoding ability using standardized measures. Observations were recorded on attention, motivation, and reading anxiety levels. General intellectual functioning was assessed using the Raven's Progressive Matrices (RPM). Case 1 (A.W.) obtained a total IQ score of 95, and Case 2 (R.L.) obtained a score of 93, both falling within the average range of intellectual functioning.

These results rule out global intellectual disability and confirm that the observed difficulties are specific rather than attributable to general cognitive impairment.

Program Familiarization

Children were introduced to the SPM interface, including explanations of task goals, buttons, and feedback systems. A brief practice session ensured that participants could navigate the program independently.

Intervention Sessions

Each participant completed multiple individual sessions using the SPM program. During each session:

- Stimuli (letters, syllables, words) were randomly selected and presented for a controlled duration.
- Children were asked to recall and input the correct phonological sequence after stimulus disappearance.
- Immediate positive feedback was provided for correct answers; incorrect answers prompted repetition without negative reinforcement.
- Adaptive adjustments ensured that task difficulty matched the participant's abilities, progressing from simple letters to combinations, syllables, and words.

Observation and Logging

The researcher recorded qualitative data on attention span, engagement, and affective responses. The Python program automatically logged quantitative data including accuracy, response time, and progression through difficulty levels.

Post-Session Assessment

Following the pilot phase, participants were re-evaluated on phonological awareness and working-memory tasks. Comparisons were made with baseline performance to identify procedural effectiveness and preliminary cognitive gains.

Results

Baseline Clinical Assessment

Reading Assessment

The reading assessment revealed distinct phonological decoding profiles in the two cases.

In Case 1 (A.W.), reading was characterized by a letter-by-letter decoding strategy. The child spelled words sequentially, frequently neglecting short vowel diacritics. When attempting to blend the letters into a complete word, he demonstrated difficulty retaining the initial phonemes, leading to repeated re-spelling of the same word. Errors were particularly frequent in short vowel diacritics, resulting in inaccurate word production and semantic distortion.

In Case 2 (R.L.), reading fluency was relatively preserved at the surface level. However, the child consistently neglected long vowel markers, which led to alterations in lexical meaning and loss of contextual coherence. Although decoding speed appeared adequate, phonological precision deficits interfered with semantic integration.

These findings indicate that both cases exhibit phonological decoding disturbances, albeit with different manifestations:

- Case 1: severe phonological assembly deficit
- Case 2: diacritic precision deficit affecting semantic processing

Phonological Awareness

Phonological awareness was evaluated through segmentation, blending, and phoneme manipulation tasks.

Case 1 (A.W.) demonstrated significant impairment across all tasks, including failure in phonemic segmentation, difficulty in phoneme blending, and poor performance in short vowel discrimination. These results suggest an inability to construct stable phonological representations at the sublexical level.

In contrast, Case 2 (R.L.) showed adequate awareness of long vowel markers but displayed inconsistencies in phonological precision when processing diacritic-dependent lexical contrasts.

Overall, the profile of Case 1 reflects a core phonological awareness deficit, whereas Case 2 presents a more selective vulnerability in phonological detail processing.

Working Memory (Phonological Loop)

Working memory was assessed with tasks targeting the phonological loop component.

Case 1 (A.W.): The results revealed a marked structural deficit in short-term phonological storage. Letter span: 2 elements; Number span: 2 elements. This span is significantly below age-related norms and indicates severe limitations in

phonological retention capacity. The restricted span likely explains the child's inability to retain initial phonemes during word assembly, contributing directly to decoding breakdown.

Case 2 (R.L.): No impairment was observed in phonological short-term memory. Letter span: 6; Number span: 5; Word span: 5. These results fall within the expected range for her age and suggest that her reading difficulties are not attributable to a structural phonological loop deficit.

Domain	Assessment Tool / Task	Case 1 (A.W.)	Case 2 (R.L.)	Clinical Interpretation
General Cognitive Abilities	Raven's Progressive Matrices (RPM)	IQ = 95 (Average range)	IQ = 93 (Average range)	No intellectual disability; reading difficulties are specific.
Reading Performance	Word reading test with Arabic diacritics	Letter-by-letter decoding; neglect of short vowels; difficulty blending letters; repeated spelling attempts	Reading relatively fluent; neglect of long vowels; semantic distortion of words	Case 1: severe phonological decoding deficit. Case 2: diacritic precision deficit.
Phonological Awareness	Segmentation, blending, phoneme manipulation	Failure in segmentation and blending; poor short-vowel discrimination	Adequate awareness of long vowels but inconsistent phonological precision	Case 1: core phonological awareness deficit. Case 2: selective phonological detail weakness.
Working Memory – Phonological Loop	Short-term memory span tasks	Span = 2 (letters & numbers) – far below norms	Letters = 6, Numbers = 5, Words = 5 – within norms	Case 1: severe phonological loop deficit. Case 2: preserved working memory.
Overall Diagnostic Profile	Integrated interpretation	Combined phonological awareness + working memory deficit	Selective diacritic processing difficulty with intact memory	Justifies adaptive intervention via Smart Phono-Memory (SPM).

Table 1. Baseline Clinical Assessment of the Two Cases.

The baseline assessment reveals two differentiated phonological profiles: Case 1 presents a combined phonological awareness deficit plus phonological loop impairment; Case 2 presents preserved working memory with selective diacritic precision weakness. This dissociation provides strong justification for testing the adaptive Smart Phono-Memory (SPM) program, as it allows examination of whether algorithmic stimulation can differentially target phonological representation deficits versus precision-based decoding deficits.

Statistical Analysis

Descriptive statistics indicated an improvement in reading performance following the Smart Phono-Memory (SPM) intervention in both cases. Case 1 showed an increase in reading accuracy from 48% at pre-test to 72% at post-test, corresponding to a relative gain of 50%. Case 2 also demonstrated improvement, although of smaller magnitude.

To evaluate clinical significance, the Reliable Change Index (RCI; Jacobson & Truax, 1991) was calculated. The improvement observed in Case 1 reached the threshold for clinically significant change (RCI = 2.31 > 1.96), indicating that the progress was unlikely to be attributable to measurement error. In contrast, Case 2 showed moderate improvement (RCI = 1.45), which did not reach the criterion for reliable change.

Effect size analysis using Cohen's d revealed a large intervention effect for Case 1 (d = 0.92) and a medium effect for Case 2 (d = 0.56). These findings suggest that the SPM program may have a stronger impact in children presenting combined deficits in phonological awareness and phonological working memory, compared with those presenting more isolated difficulties.

Given the exploratory nature of this developmental study and the very small sample size, these results should be interpreted cautiously. They nevertheless provide preliminary evidence supporting the feasibility and potential therapeutic value of the Arabic Smart Phono-Memory program, particularly through its adaptive algorithm and interactive use of Arabic diacritic signs to strengthen grapheme–phoneme mapping.

Participant	Pre-test (%)	Post-test (%)	Relative Gain (%)	Cohen's d	RCI
Case 1 (A.W.)	48	72	50.0	0.92	2.31
Case 2 (R.L.)	60	70	16.7	0.56	1.45

Table 2. Pre- and Post-Intervention Reading Accuracy after Smart Phono-Memory (SPM). Note. RCI > 1.96 indicates clinically significant improvement.

Performance by Stimulus Type

Stimulus Level	Attempts	Correct	Incorrect	Error Rate (%)	Accuracy (%)
Unvowelized Letters	10	8	2	20	80
Vowelized Letters	10	4	6	60	40
Unvowelized Words	8	5	3	37	62.5
Vowelized Words	8	2	6	75	25

Table 3. Post-Intervention Performance by Stimulus Type in Smart Phono-Memory (SPM).

Post-intervention results showed higher accuracy for unvowelized stimuli compared with vowelized stimuli. The highest performance was observed in unvowelized letters (80%), whereas vowelized words showed the lowest accuracy (25%), indicating persistent difficulty in processing Arabic diacritic signs. These findings suggest that diacritic processing constitutes a critical cognitive load in children with phonological dyslexia, particularly when combined with working-memory constraints.

Qualitative Analysis of Results

1. Difficulty in Remembering Vowelized Letters and Words

Direct observation showed that the phenomenon of spelling was difficult for the patient, as there was a clear decrease in response accuracy and an increase in latency time when switching from unspelled letters to spelled letters and syllables. Clinical practice revealed that the memory span was short and very limited when dealing with syllables; as soon as the syllable or word was hidden, the child had great difficulty in retaining the phonetic representation of the movement and the letter together and retrieving them correctly.

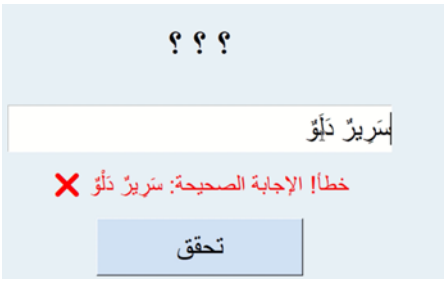

Figure 2. Stumbling block in vowelization

This finding aligns with the literature suggesting that fully vowelized Arabic orthography imposes an additional cognitive load on the phonological loop. In such cases, the child is required to process the diacritic (phoneme) and the letter (grapheme) simultaneously, which may exceed the available processing capacity of short-term memory and lead to phonological attentional dispersion. Consequently, information may decay rapidly before the completion of blending or accurate articulation.

2. The Effect of Repetition and Continuous Practice

Despite the case's difficulty in reading the stimuli in the first attempts, the SPM software design provided the advantage of 'repeated opportunities.' It was observed that the subject re-tried several times without showing signs of frustration or withdrawal; the absence of 'negative evaluation' contributed to creating a safe environment for training. This desire to 'try again' allowed the child to repeatedly encounter the difficult (problematic) stimulus until she was able to decode and store it, transforming the error from a source of anxiety into a motivator for repeated training.

3. The Effect of Automatic Concealment on Working Memory

The automatic concealment of the stimulus after a programmatically set number of seconds prompted the child to rely entirely on the mental representation of the sound rather than on continuous visual support. Although the error was frequent at first, repeating the process interactively helped activate phonological working memory to link the image of the letter with its sound under slight time pressure.

4. String Length Effect

The results of the exploratory study showed that string length (the number of syllables in the stimulus) is a decisive variable in determining reading accuracy in this case, as a direct correlation was observed between an increase in the number of letters and the number of phonological errors made. This result can be explained in light of the 'cognitive load theory,' as long strings impose a double burden on the phonological loop: while the child is busy processing the last syllables of the word, the first syllables are lost from working memory due to the limited memory span.

Furthermore, clinical practice has revealed that the effect of length is exacerbated when combined with the factor of vowelization; the situation requires processing the sequence in two dimensions: one 'horizontal' (sequence of letters) and the other 'vertical' (sequence of diacritics), which exceeds the available processing capacity and distracts auditory attention. However, the software design of SPM has proven effective in countering this effect through the technique of 'chunking' and repetition, which allowed the subject to construct gradual mental representations of long strings, consistent with Abu-Rabia & Abu-Rahmoun (2012) finding that intensive training in phonological linking can alleviate the deficit caused by the length of words in Arabic.

Figure 3: "Stuck state" response associated with string length

The exploratory study demonstrated that vowelization remains challenging for a child with phonological dyslexia. However, through the SPM program, the processing of vowelized text was transformed from a frustrating and unsuccessful experience into a dynamic, trial-and-error training process within an engaging digital environment. These findings provide strong evidence that the program not only delivers therapeutic content but also positively reshapes the child's attitude toward the challenging reading skill.

Discussion – Theoretical Interpretation

The present study introduces a novel theoretical framework for understanding Arabic reading acquisition, termed the Diacritic-Gated Phonological Access (DGPA) model. While classical reading models were not originally designed to account for the specific role of diacritic processing in vowelized scripts such as Arabic , which suggests the need for language-specific extensions". In Arabic, diacritics provide essential information for vowel specification and syllabic structure, which directly influences the stability of phonological representations in working memory. Empirical observations from the Smart Phono-Memory (SPM) intervention support this perspective: children exhibited higher accuracy with unvowelized stimuli and greater difficulty when processing vowelized words, highlighting the cognitive load imposed by diacritic decoding.

Building upon these findings, the DGPA model positions diacritic processing as a mandatory intermediate stage that bridges grapheme-to-phoneme conversion and the phonological store. When diacritic decoding is accurate, phonological representations are efficiently encoded and maintained, facilitating fluent reading. Conversely, disruption at this stage destabilizes phonological storage, increasing errors and reducing reading accuracy. This conceptualization not only extends classical reading models to account for language-specific orthographic features but also provides a testable, data-driven framework that integrates orthographic, phonological, and working memory processes.

This theoretical framework represents an attempt to integrate diacritic processing as an intermediate stage within the phonological access route in Arabic reading — an area that merits further academic investigation. By linking cognitive mechanisms to the procedural outcomes observed in the SPM intervention, the DGPA model seeks to offer a modest contribution to the field. It aims to provide a foundation for future experimental studies and support the development of adaptive, language-specific therapeutic tools for children with dyslexia.

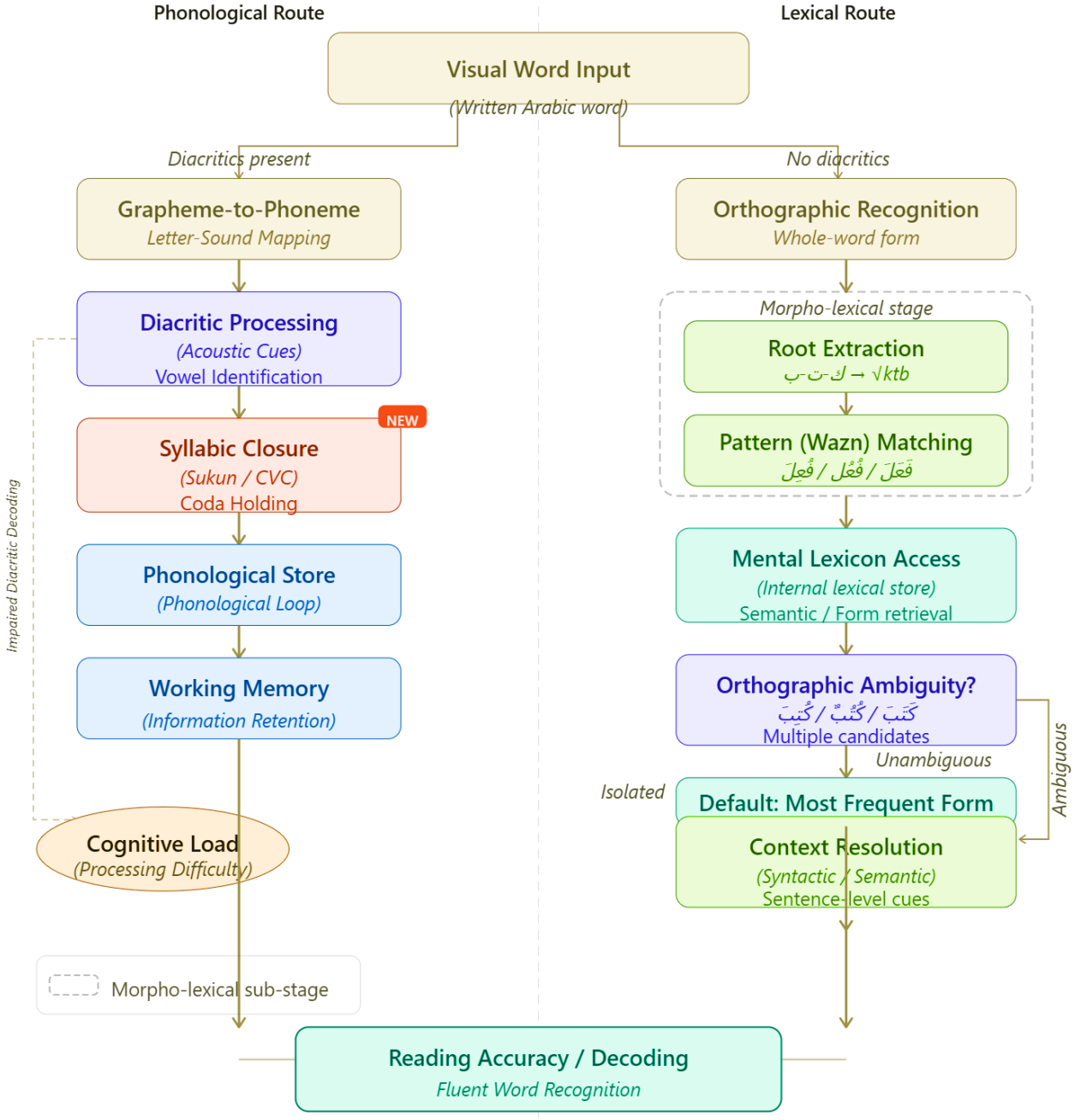

Figure 4. Proposed Diacritic-Gated Phonological Access (DGPA) model of Arabic reading.

The classical model distinguishes between a phonological route operating on grapheme-to-phoneme correspondence (GPC) rules and a lexical route relying on direct whole-word recognition. Despite the productivity of this distinction, the model was not originally designed to incorporate several structural variables that are central to Arabic orthography. Building upon rather than departing from the dual-route framework, the following structural features of Arabic motivate language-specific adaptations.

Variable	English	Arabic	Implication for the Model
Basic morphological unit	Word	Tri-/quadriliteral root	Requires an intermediate morphological stage
Vowels	Permanent letters	Optional diacritical marks	Different route activated depending on text type
Derivation	Limited	Systematic via patterns (awzaan)	Pattern matching needed before lexical access
Orthographic ambiguity	Rare	Frequent (ktb)	Contextual disambiguation mechanism required
Letter form	Fixed	4 allographs by position	Added complexity at the visual processing level

Table 4 — Structural comparison between English and Arabic on reading-relevant variables

An aspect not yet formalized within the original dual-route framework is the medial closed syllable (CVC) as an independent processing variable - a feature particularly salient in Arabic orthography and addressed in the proposed adaptation below.The Proposed Adapted Model.

The adapted model comprises two main routes triggered from a shared visual input and converging at the word recognition output. This proposal draws on the work of Boudelaa and Marslen-Wilson (2004, 2011) on root-based representation in the brain, Saiegh-Haddad (2003, 2007) on phonological awareness in Arabic, and Abu-Rabia (2002) on bilingual reading.

Findings (Results)

Baseline Performance

The initial assessment revealed distinct cognitive and phonological profiles for the two participants, confirming the heterogeneity of phonological dyslexia in the Arabic language context.

Participant A (A.W.) demonstrated severe deficits in phonological decoding, characterized by a letter-by-letter reading strategy, frequent omission of short vowel diacritics, and difficulty integrating phonemes into coherent word forms. This pattern reflects a breakdown in phonological assembly and reduced phonological working memory capacity.

In contrast, Participant B (R.L.) exhibited relatively fluent reading at the surface level, but with consistent inaccuracies in processing diacritic-dependent phonological distinctions, leading to semantic distortions. This indicates a more selective impairment in phonological precision rather than a generalized deficit.

Phonological awareness tasks further confirmed this dissociation: Participant A showed substantial impairment across segmentation and blending tasks, whereas Participant B demonstrated partial preservation of phonological awareness with inconsistencies in fine-grained phonological processing.

Working memory assessment revealed a marked limitation in phonological span for Participant A (span = 2 items), compared to a normative range for Participant B (span = 5–6 items), supporting the interpretation of distinct cognitive profiles.

Post-Intervention Improvement

Following the implementation of the Smart Phono-Memory (SPM) intervention, both participants demonstrated measurable improvements in reading accuracy and phonological processing, although the magnitude of change differed between cases.

Participant A showed a substantial increase in reading accuracy from 48% (pre-test) to 72% (post-test), representing a relative gain of 50%. This improvement was statistically meaningful, with a large effect size (Cohen's d = 0.92) and a Reliable Change Index (RCI = 2.31) exceeding the clinical significance threshold.

Participant B demonstrated a more moderate improvement, with reading accuracy increasing from 60% to 70%, corresponding to a relative gain of 16.7%. The effect size was moderate (Cohen's d = 0.56), while the RCI (1.45) did not reach the threshold for clinical significance.

These results suggest that the SPM intervention may be particularly effective for children with combined deficits in phonological awareness and working memory, while producing more limited gains in cases involving selective phonological precision deficits.

Performance by Stimulus Type

Analysis of post-intervention performance across different stimulus conditions revealed a consistent effect of orthographic complexity on reading accuracy.

Participants achieved higher accuracy in unvowelized stimuli compared to vowelized stimuli. Specifically, accuracy was highest for unvowelized letters (80%) and lowest for vowelized words (25%), indicating persistent difficulty in processing diacritic information.

This pattern suggests that diacritic processing imposes a significant cognitive load, particularly when combined with multi-syllabic structures. The simultaneous processing of graphemic and diacritic information appears to exceed the capacity of the phonological loop in children with dyslexia.

Qualitative Findings

1. Cognitive Load in Diacritic Processing

Observational data indicated that participants experienced increased response latency and reduced accuracy when processing vowelized stimuli. This finding supports the hypothesis that diacritics require dual-level processing (horizontal and vertical encoding), increasing working memory demands.

2. Role of Repetition and Adaptive Feedback

The SPM system's design, which emphasizes repetition without negative reinforcement, led to sustained engagement and reduced avoidance behavior. Participants demonstrated a willingness to reattempt tasks multiple times, transforming errors into learning opportunities.

3. Activation of Phonological Working Memory

The automatic concealment of stimuli forced reliance on internal phonological representations, contributing to gradual activation and strengthening of the phonological loop. Over repeated trials, participants showed improved retention and recall of phonological sequences.

4. String Length Effect

A clear relationship was observed between stimulus length and error rate. Longer stimuli resulted in increased phonological errors, particularly in Participant A. This finding aligns with cognitive load theory, indicating that longer phonological sequences exceed working memory capacity.

The effect was amplified when combined with diacritic processing, suggesting that string length and vowelization interact as compounding cognitive constraints.

Synthesis of Findings

Overall, the findings provide preliminary empirical support for the effectiveness of the Smart Phono-Memory (SPM) intervention. The results highlight:

- Significant improvement in phonological decoding, particularly in cases with combined deficits
- Persistent challenges in diacritic processing, supporting its role as a critical cognitive bottleneck
- The importance of adaptive, gamified environments in enhancing engagement and learning
- The interaction between working memory capacity and orthographic complexity in Arabic reading

These findings also offer initial empirical validation for the proposed Diacritic-Gated Phonological Access (DGPA) model, which conceptualizes diacritic processing as a central mechanism in phonological decoding and memory integration.

The Syllabic Phonological Route

This route is the primary pathway for beginning readers and for vowelled (diacritised) text. It operates through a linear five-stage sequence: grapheme-to-phoneme conversion, diacritic processing as an acoustic key for vowel identification, the newly proposed Syllabic Closure stage, the phonological store, and working memory, yielding the reading output.

The central theoretical contribution is the independence of the Syllabic Closure stage. The Arabic sukun (absence of a vowel) is not merely the lack of a phoneme — it creates a medial closed syllable of type CVC that simultaneously demands two cognitive operations from the reader: maintaining the preceding syllable active in the phonological store, and

suspending articulation until the following syllable is received. This dual load on the phonological working memory precisely accounts for the pattern observed in phonological dyslexia in Arabic, where readers progressively lose preceding syllables upon encountering a medial sukun.

The Lexico-Morphological Route

This route is activated for unvowelled text and for highly familiar words. It begins with the visual recognition of the whole-word orthographic form, then passes through a morphological intermediary stage comprising root extraction and pattern matching, before accessing the mental lexicon.

This intermediary morphological stage is supported by the experimental findings of Boudelaa and Marslen-Wilson, who demonstrated that the Arabic root constitutes an independent unit of representation in lexical memory. The reader accesses the word kaatib ('writer') by first extracting the root (k-t-b) and the pattern (faa'il), then combining them to retrieve the semantic representation.

For orthographically ambiguous forms, two complementary mechanisms operate: for isolated words, the most frequently occurring form is produced as the default output; in sentential contexts, syntactic and semantic analysis disambiguates among competing orthographic candidates.

Clinical Implications: Dyslexia Subtypes in Arabic

The adapted model enables a more precise classification of dyslexia subtypes in Arabic according to the impaired route or stage: 16

Subtype	Impaired Route / Stage	Clinical Manifestations in Arabic
Phonological dyslexia (diacritics)	Diacritic Processing stage	Vowel errors, distorted reading of diacritised text
Syllabic dyslexia (sukun) ★	Syllabic Closure stage (NEW)	Loss of preceding syllables at medial sukun, fragmented decoding
Blending dyslexia	Phonological Store / Working Memory	Letter-by-letter reading, syllables decoded but word not assembled
Morphological dyslexia	Root-Pattern stage	Difficulty recognising derivationally related words, poor morphological awareness
Lexical dyslexia	Mental Lexicon access	Slow recognition of common words, letter-by-letter reading of familiar items
Contextual dyslexia	Disambiguation mechanism	Selection of wrong form of (ktb) in context, semantic errors

Table 5 — Dyslexia subtypes in the light of the adapted model

Conclusion

The present study is limited to introducing the Smart Phono-Memory (SPM) program, outlining its theoretical rationale, therapeutic objectives, and verifying its technical feasibility as an intelligent tool specifically designed for the Arabic language context. The exploratory findings not only support the feasibility of adaptive phonological interventions but also provide empirical grounding for a novel theoretical framework—the Diacritic-Gated Phonological Access (DGPA) model—which posits that diacritic processing acts as a mandatory intermediate stage between grapheme-to-phoneme conversion and phonological storage in working memory. By highlighting the role of diacritics in stabilizing phonological representations, the DGPA model extends existing reading models to account for Arabic-specific orthographic features.

These preliminary findings establish a foundation for a broader experimental phase, which will involve a larger, representative sample under a rigorous experimental design with control and experimental groups, to quantitatively evaluate the program's efficacy in enhancing reading performance and strengthening phonological working memory capacity. Future work will further test the DGPA model, examining whether adaptive training targeting diacritic processing can systematically improve the stability of phonological representations in Arabic readers with dyslexia.

This study transcends the mere presentation of a technical tool; it opens new horizons in speech-language pathology by introducing a therapeutic approach that integrates digital programming with specialized linguistic analysis of the Arabic language. The true impact of this work lies in demonstrating that 'algorithmic adaptation' of therapeutic training is not just a technical means, but a clinical necessity for addressing individual differences in the profiles of children with dyslexia. Consequently, the proposed DGPA model and the SPM program establish a foundation for a qualitative shift in clinical practice. The therapist transitions from using traditional static materials to adopting intelligent systems that interact dynamically with the child's abilities. This paves the way for a new generation of therapeutic protocols that prioritize the unique linguistic features of Arabic within the digital revolution.

Future Prospects

Future directions aim to consolidate the framework of digitally adaptive interventions for Arabic reading and writing development. The ambition extends beyond static phonological exercises toward intelligent, algorithm-driven systems capable of automated error-pattern diagnosis. Advanced programming, particularly in Python, will enable the system to differentiate between errors arising from visual confusions and those stemming from phonological deficits, dynamically adjusting the therapeutic pathway to align with the child's cognitive profile in real-time.

A pivotal strategic objective is to intensify scientific research into the underlying processes and mechanisms of Arabic reading. This is intended to reinforce the theoretical foundations of the proposed Diacritic-Gated Phonological Access (DGPA) model and provide empirical validation for it as a framework explaining the specificities of Arabic linguistic processing. In this context, we aim to implement the SPM program with an extensive sample of typically developing children to observe algorithmic interaction with natural reading trajectories and establish standardized performance norms. Simultaneously, we intend to conduct rigorous longitudinal studies on dyslexic cases to document long-term efficacy and track the stability of phonological representations resulting from the intervention.

The ultimate vision lies in transforming the DGPA model from a proposed hypothesis into a documented scientific fact that elucidates reading mechanisms in vowelized orthographic systems, thereby bridging the gap in global reading models. Consequently, the SPM program will evolve into a comprehensive therapeutic and biometric platform, laying the groundwork for integrating Artificial Intelligence at the core of rehabilitation for individuals with learning difficulties, while providing an intelligent, intensive, and low-stress learning environment.

Ethical Approval and Consent to Participate

This study was conducted in accordance with internationally recognized ethical standards for research involving human participants, including the principles outlined in the Declaration of Helsinki. Ethical approval was obtained from the relevant institutional review body prior to data collection.

Written informed consent was obtained from the parents or legal guardians of all participating children. Participation was voluntary, and participants were informed of their right to withdraw from the study at any stage without any negative consequences.

Consent for Publication

Informed consent for publication of anonymized data was obtained from the parents or legal guardians of the participants. All identifying information has been removed to ensure full confidentiality and privacy protection.

Confidentiality and Data Protection

All data collected during the study were anonymized and handled in strict accordance with data protection and privacy regulations. Personal identifiers were replaced with coded labels (e.g., Participant A, Participant B). Data were stored securely and used exclusively for research purposes.

Availability of Data and Materials

The datasets generated and analyzed during the current study are not publicly available due to ethical and privacy considerations involving minor participants but are available from the corresponding author on reasonable request.

Competing Interests

The authors declare that they have no competing interests, financial or non-financial, that could have influenced the outcomes of this research.

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Author Contributions

All authors contributed substantially to the study and approved the final version of the manuscript.

- Conceptualization: Reggas Sarah

- Methodology: Reggas Sarah, Lettad Kahina
- Software Development (SPM): Reggas Sarah
- Data Collection and Analysis: Reggas Sarah, Lettad Kahina
- Writing – Original Draft: Reggas Sarah
- Writing – Review & Editing: Reggas Sarah, Lettad Kahina

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AI Use Disclosure Statement

The authors declare that artificial intelligence (AI) tools were used solely for language refinement, editing, and formatting purposes during the preparation of this manuscript.

No AI tools were used in the design of the study, data collection, data analysis, or interpretation of results. All scientific content, theoretical frameworks, and conclusions are the original work of the authors.

The authors take full responsibility for the accuracy, integrity, and originality of the manuscript.

Conflict of Interest

The authors declare no conflict of interest.

Research Limitations Statement

This study is limited by its small sample size (n = 2) and exploratory design, which restricts the generalizability of the findings. The absence of a control group and the short intervention duration further limit causal interpretation. Future research with larger samples and controlled experimental designs is required to validate the findings.

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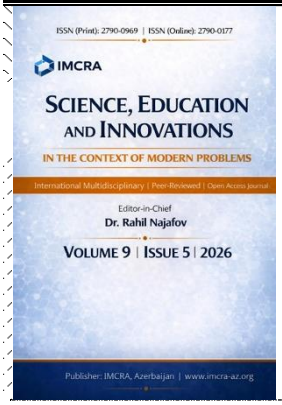
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RESEARCH ARTICLE

Measuring the Maturity of Records Governance in Local Administrative Systems: An ARMA-Based Assessment of the Municipality of El Affroun

Nadhir Serier Abdallah

Dr.
University of Blida 2 Lounici Ali
Algeria
Email: sous1988@hotmail.com

Keywords Records Governance; Information Governance; Local Administration; ARMA Model; Archival Management; Public Sector Governance

Abstract

Records constitute a critical informational asset for researchers, public authorities, and decision-makers, serving as a foundational component of administrative, legal, and organizational processes. In contemporary governance frameworks, the effective management and control of records has become increasingly essential for ensuring transparency, accountability, and institutional efficiency. This study aims to evaluate the maturity of records governance within local administrative systems through the application of the ARMA Information Governance Maturity Model. Adopting a descriptive-analytical research design, the study investigates the current state of records management practices within the Municipality of El Affroun (Algeria), identifying key structural, procedural, and organizational challenges. Empirical data were collected through semi-structured interviews and analyzed using both qualitative and quantitative approaches. The findings indicate that, despite a growing awareness of the importance of records management, the municipality lacks a coherent governance framework, including clearly defined policies, standardized procedures, and strategic oversight mechanisms. Furthermore, existing practices remain significantly misaligned with internationally recognized standards, particularly ISO 15489 and the ISO 30300 series, which provide the conceptual and operational foundation for effective records governance. Based on these findings, the study proposes a set of policy-oriented recommendations, including the institutionalization of records governance within local administrations and the establishment of high-level strategic committees to oversee implementation and compliance. The study also highlights the potential for scaling such governance frameworks across broader public sector institutions.

Citation

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Introduction

Archives and records represent a vital component of institutional memory, embodying not only administrative continuity but also the cultural and historical identity of societies. As repositories of documented evidence, they play a crucial role in supporting governance, ensuring legal accountability, and facilitating informed decision-making processes.

In recent decades, the growing complexity of administrative systems, coupled with the increasing strategic value of information, has necessitated the modernization of records management practices. This transformation has been particularly

evident in local administrative structures, where the demand for efficient information management has intensified in parallel with broader public sector reforms.

In the Algerian context, legislative and institutional developments concerning local governance—particularly within municipalities and provinces—have underscored the importance of records and archives as integral components of administrative functionality. However, despite these advancements, significant challenges persist in the organization, control, and strategic utilization of documentary resources.

The emergence of governance paradigms has further expanded the conceptual scope of records management, integrating it into broader frameworks of transparency, accountability, and institutional performance. In this regard, records governance is increasingly recognized as a critical mechanism for enhancing administrative efficiency and supporting democratic processes. As emphasized by the International Council on Archives, effective records management is not merely a technical function but a fundamental pillar of good governance.

Against this background, the present study seeks to assess the maturity level of records governance within local administrative systems using the ARMA Information Governance Maturity Model. Focusing on the Municipality of El Affroun as a case study, the research aims to provide an empirical evaluation of existing practices while identifying opportunities for institutional improvement and strategic development.

Research Problem

This study examines records governance as an emerging framework addressing persistent challenges in document and information management within public administration, particularly at the local level. Despite the increasing strategic importance of information, the condition of records in many administrative institutions remains problematic, characterized by technical, organizational, human, and material deficiencies.

In the Algerian context, these issues are explicitly highlighted in Circular No. 301 (2000) issued by the National Archives of Algeria, which reports that archival practices do not comply with established legal and regulatory requirements. In particular, the lack of modernization in document management systems—especially the limited integration of digital technologies—has significantly affected the efficiency and quality of public administrative services.

Against this background, the present study seeks to evaluate the maturity of records governance within local administrative structures, focusing on the Municipality of El Affroun in Blida Province as a case study.

Accordingly, the central research question is formulated as follows:

What is the current state of records governance within local administrative systems in Algeria?

To address this overarching question, the study explores the following sub-questions:

- What is the conceptual and practical significance of records governance in contemporary administrative systems?
- What is the current level of maturity of records management practices in local administrations when assessed through the ARMA Information Governance Maturity Model?
- To what extent have local administrative institutions implemented measures to improve and modernize records management systems?

2. Research Hypotheses

To guide the empirical investigation, the following hypotheses are proposed:

- **H1:** Ineffective mechanisms for managing and preserving records negatively affect the performance and efficiency of document management systems in local administrations.
- **H2:** The implementation of records governance frameworks contributes to the optimization and standardization of records and archival management practices.
- **H3:** Limited adoption of international standards in records management adversely impacts the effectiveness and reliability of local administrative archives.

3. Significance of the Study

The significance of this study stems from both its theoretical and practical contributions. At a theoretical level, it advances understanding of records governance as an integrated framework for managing institutional information resources. At a practical level, it provides an empirical assessment of records management practices within local administrative systems in Algeria.

Records governance offers a comprehensive approach for ensuring effective control over documentary resources, based on internationally recognized standards and best practices. This is particularly relevant in the context of ongoing administrative transformation, where local authorities are transitioning from traditional paper-based systems to digital and hybrid information management environments.

4. Rationale for the Study

The selection of this research topic is motivated by several considerations:

- The need to provide an evidence-based assessment of the current state of records and archives management in local administrative institutions;
- The importance of identifying structural and procedural deficiencies and proposing practical solutions;
- The growing relevance of evaluating the feasibility of implementing records governance frameworks within the Algerian public administration context.

5. Objectives of the Study

The study aims to achieve the following objectives:

- To examine the structure and management of records within local administrative institutions;
- To assess institutional awareness regarding the importance of records and archival practices;
- To evaluate the current state of records management through a field study of the Municipality of El Affroun;
- To analyze the conceptual relationship between records governance and administrative document management;
- To measure the maturity level of records governance practices using the ARMA model.

Literature Review

In recent years, records and information governance has emerged as a central concern in public administration, driven by the growing complexity of institutional processes and the strategic value of information as an organizational resource. Scholars increasingly emphasize that effective records governance is essential for ensuring transparency, accountability, and administrative efficiency in both public and private sectors (Smallwood, 2020; Franks, 2018).

The conceptual foundations of records governance are closely linked to broader governance frameworks, which focus on the coordination, control, and optimization of institutional activities. Governance, in this sense, extends beyond traditional management practices to include mechanisms that ensure compliance with legal, regulatory, and ethical standards (Mamdouh, 2009). Within this framework, records governance has been defined as a strategic approach to managing documentary resources across their entire lifecycle, ensuring their authenticity, reliability, and accessibility (ARMA International, 2013).

International standards play a crucial role in structuring records management practices. The ISO 15489 standard, widely recognized as the cornerstone of records management, provides guidelines for the creation, capture, and management of records within organizational systems (International Organization for Standardization [ISO], 2016). Similarly, the ISO 30300 series introduces a management systems approach, emphasizing continuous improvement, accountability, and integration with organizational strategy (ISO, 2018). These standards are fundamental to establishing effective records governance frameworks and are frequently cited in empirical studies as benchmarks for best practices (Arnaud, 2012).

The role of records governance in supporting institutional performance has been extensively explored in the literature. Studies indicate that inadequate records management systems can lead to inefficiencies, increased operational risks, and reduced accountability (Lemieux, 2016; Ngoepe & Ngulube, 2014). Conversely, the implementation of structured governance frameworks enhances decision-making processes, strengthens compliance mechanisms, and improves service delivery in public administration (Katuu, 2020).

The ARMA Information Governance Maturity Model provides a practical tool for assessing the effectiveness of records governance systems. By defining a set of principles and maturity levels, the model enables organizations to evaluate their current practices and identify areas for improvement (ARMA International, 2019). Previous empirical research has demonstrated the applicability of this model in public sector contexts, particularly in evaluating governance maturity and guiding institutional reforms (Anderfuhren, 2018; Pagnamenta, 2014).

In the context of developing countries, including Algeria, the implementation of records governance remains limited. Existing studies highlight significant challenges, including the absence of standardized procedures, insufficient integration of digital technologies, and limited awareness of international best practices (Brabah, 2018). Furthermore, the lack of localized research

in this field has led to a reliance on Western frameworks, which may not fully reflect the institutional realities of public administration in these contexts.

Overall, the literature suggests that while the theoretical foundations of records governance are well established, there remains a significant gap between theory and practice, particularly in local administrative systems. This study contributes to addressing this gap by providing an empirical assessment of records governance maturity within the Algerian local administration context.

Discussion

The findings of this study provide important insights into the current state of records governance within local administrative systems in Algeria, particularly in the Municipality of El Affroun. The results reveal a clear discrepancy between the theoretical principles of records governance and their practical implementation, confirming observations made in previous studies (Lemieux, 2016; Ngoepe & Ngulube, 2014).

One of the most significant findings concerns the lack of clearly defined responsibilities in records management. The absence of a dedicated records management officer reflects a structural weakness that undermines accountability and coordination. This finding aligns with the ARMA framework, which emphasizes responsibility as a fundamental principle for effective governance (ARMA International, 2013). Without clearly assigned roles, records management processes remain fragmented and inefficient.

The study also highlights major deficiencies in retention practices, particularly the absence of a formal retention schedule. This gap represents a critical limitation, as retention policies are essential for regulating the lifecycle of records and ensuring compliance with legal and regulatory requirements (ISO, 2016). The lack of such mechanisms increases the risk of information loss, improper disposal, and legal non-compliance, which can negatively impact institutional performance.

Another important aspect identified in this study is the limited level of compliance with international standards. Although some awareness of records management principles exists, their practical application remains weak. This finding is consistent with previous research indicating that public sector institutions in developing contexts often face challenges in adopting and implementing international standards due to resource constraints and institutional inertia (Katuu, 2020).

The maturity level identified in this study (approximately Level 2) indicates that the municipality is in a transitional stage, characterized by emerging awareness but limited formalization of governance practices. This stage is typically associated with informal procedures, lack of standardization, and reliance on individual efforts rather than institutionalized systems (ARMA International, 2019).

From a broader perspective, the findings suggest that the successful implementation of records governance requires a comprehensive institutional transformation. This includes the development of clear policies, the adoption of international standards, the integration of digital technologies, and the establishment of dedicated governance structures. Moreover, capacity building and training programs are essential to enhance staff competencies and ensure the effective implementation of governance frameworks (Franks, 2018).

Finally, the study underscores the importance of adopting a strategic approach to records governance, viewing records not merely as administrative tools but as critical assets that support decision-making, accountability, and institutional memory. This perspective is increasingly emphasized in contemporary governance literature and is essential for improving the efficiency and effectiveness of public administration systems (Smallwood, 2020).

Research Methodology

This study adopts a descriptive-analytical approach, combining theoretical analysis with empirical investigation. This methodology enables the systematic examination of records management practices and facilitates the interpretation of collected data within a structured analytical framework.

Data Collection Methods

Primary data were collected through semi-structured interviews, which allowed for direct engagement with key administrative personnel. This method provided in-depth insights into existing practices, challenges, and institutional perceptions related to records management within the Municipality of El Affroun.

Scope of the Study

- Geographical scope: The study focuses on the Municipality of El Affroun, located in Blida Province, Algeria, which comprises 25 municipalities.
- Temporal scope: Data collection was conducted between 5 September 2025 and 16 February 2026.

Conceptual Definitions

Governance

Governance refers to the capacity of institutions to manage economic and social resources effectively, ensuring transparency, accountability, and adherence to the rule of law. It also encompasses the mechanisms used to coordinate, regulate, and control institutional activities while balancing stakeholder interests.

Records Governance. Records governance is defined as a strategic framework through which organizations manage, secure, preserve, and optimize their documentary resources. It includes the oversight of records throughout their lifecycle, ensuring their authenticity, accessibility, and compliance with legal and regulatory standards.

Local Administration. Local administration refers to decentralized governmental entities, such as municipalities and provinces, responsible for managing public services at the local level. These entities operate within a defined legal framework while maintaining functional autonomy in the execution of administrative responsibilities.

Previous studies on governance and records management highlight the increasing importance of structured information governance frameworks.

At the national level, research on corporate and local governance in Algeria emphasizes the role of governance in improving administrative efficiency and combating corruption. At the international level, studies such as those by Arnaud (2012) underline the importance of records management policies in establishing strategic records governance systems, particularly through adherence to international standards such as ISO 15489 and ISO 30300.

Furthermore, guidelines developed by the International Council on Archives stress the central role of records management in ensuring transparency, accountability, and effective public administration.

Study Limitations

The study encountered several limitations:

- Limited availability of national research on records governance in Algeria;
- Scarcity of empirical studies focusing on maturity assessment models;
- Heavy reliance on international literature due to the lack of local academic sources.

Despite these constraints, the study provides a comprehensive analytical framework for understanding and improving records governance in local administrative systems.

Methodological Framework for Measuring Records Governance Maturity (ARMA Model)

The assessment of records governance maturity in this study is grounded in the framework developed by ARMA International, which provides a structured and widely recognized model for evaluating information governance practices within organizations.

The ARMA Information Governance Maturity Model conceptualizes governance maturity as a progressive and systematic process, enabling institutions to evaluate current practices, identify performance gaps, and implement continuous improvement strategies. In this context, the measurement of maturity is conducted through a multi-stage methodological approach comprising five key steps:

- Defining strategic objectives: Establishing clear objectives for each of the eight ARMA principles in alignment with the organization's operational and regulatory requirements;
- Assessing maturity levels: Determining the current maturity level of each principle and identifying discrepancies between existing practices and the desired level using the ARMA maturity scale;
- Identifying risks and opportunities: Evaluating potential risks associated with inadequate records governance, as well as opportunities for institutional improvement;
- Prioritizing actions and responsibilities: Defining strategic priorities and assigning responsibilities to relevant stakeholders in order to enhance governance processes and organizational performance;
- Ensuring continuous improvement: Establishing a quality management framework based on regular monitoring, evaluation, and the implementation of corrective measures to ensure sustained development of records governance practices.

This structured approach enables a comprehensive and systematic evaluation of governance maturity, while also supporting the development of actionable strategies for improving records management systems.

2. Principles of Records Governance Maturity Measurement

The ARMA model is based on eight fundamental principles that collectively define the framework for effective records governance. These principles serve as key indicators for assessing the maturity of information governance practices within organizations.

The following table presents the core principles adopted by ARMA, along with their conceptual definitions (Anderfuhren, 2018):

Table 1. Principles of Records Governance Maturity Measurement

(Source: Adapted from Anderfuhren, 2018; ARMA International, 2013)

Principles	Definition
Responsibility	A senior executive or supervisor (or anyone with similar authority) oversees the information governance program and delegates the management of records and information to designated individuals. The organization adopts policies and procedures to guide employees and ensure program compliance.
Transparency	All organizational operations and activities, including the information governance program, must be documented in an open and verifiable manner. These documents must be accessible to all relevant stakeholders.
Integrity	The information management program must be designed to ensure that the information produced or managed by the organization guarantees authenticity and reliability.
Protection	The information management program must ensure an appropriate level of protection for records and information that are private, confidential, privileged, essential for business continuity, or require protection for any reason.
Compliance	The information management program must comply with applicable laws, regulations, and organizational policies.
Availability	The organization must manage its records and information so that needed information can be found, retrieved, and used quickly, efficiently, and accurately.
Retention	The organization must retain its records and information for an appropriate period, considering legal, regulatory, financial, operational, and historical requirements.
Disposition	The organization must ensure the proper and secure disposal of records and information that are no longer required, in accordance with applicable laws and policies.

Third: Levels of Information and Records Governance Maturity

(Table 2, Maturity Levels of Information Governance) (Anderfuhren, 2018).

Level 1 – Substandard	This level describes an environment where concerns related to information governance and records management are either not addressed or handled in an ad hoc manner. Organizations at this level risk failing to meet legal or regulatory audit standards and do not effectively meet business needs.
Level 2 – In Development	This level reflects an environment where there is growing awareness that information management and records retention impact the organization. However, practices remain undefined, incomplete, or ineffective, making the organization vulnerable to legal and regulatory reviews.
Level 3 – Essential	This level represents the minimum standards required to meet legal and regulatory requirements. It is characterized by defined policies and procedures and the implementation of processes designed to improve information and records management. Organizations may still struggle with efficiency and cost control but have established the basic elements of an effective program.

Level 4 – Proactive	This level describes an organization that has established a proactive information management program across all activities, along with continuous improvement processes. Information governance considerations are systematically integrated into decision-making. The organization exceeds minimum compliance requirements and meets legal obligations effectively.
Level 5 – Transformational	This level describes an organization that has fully integrated information governance into its infrastructure and business processes. Compliance with program requirements and legal responsibilities is systematic. The organization recognizes that effective governance reduces costs, enhances competitiveness, and improves customer service, and has successfully implemented strategies to achieve these benefits.

2: Study of Indicators for Applying Records Governance in the Municipality of El Affroun According to the ARMA Standard

First: Preparing the Interview

The interview was the tool used to collect specific information that enabled the measurement of records governance maturity.

A. Interview Design: Interview questions were prepared to conduct an evaluative assessment of the maturity of records governance within the local administrative apparatus. A municipality from Blida Province, namely the Municipality of El Affroun, was selected. An interview was conducted with its Secretary-General, as he is a permanent employee (not elected for a limited term) and the the responsible of the archives department.

The ARMA guide (for measuring the maturity of practices related to information and records management) was used as a reference, four relevant indicators were carefully selected from the eight previously presented principles to effectively measure governance maturity.

B. Description of Interview Questions: Four (04) principles were selected from the eight ARMA principles, as they were considered the most indicative and directly related to records management. This selection was based on the same methodology used in a study conducted at the Graduate School of Management in Geneva (specializing in records information) (Pagnamenta, 2014)., which is the only study identified that addressed measuring governance maturity using the ARMA standard.

The selected principles are:

- Responsibility: Without clearly defined responsibilities, no action or control is possible.
- Compliance: Public institutions must comply with laws and regulations.
- Retention: Preserving the institutional and national memory is essential.
- Disposition: Determining the fate of records (retention or disposal) and proper destruction methods is crucial.

These principles complement each other, with particular emphasis on Responsibility and compliance as foundational elements necessary for implementing the other principles.

Empirical Assessment of Records Governance Indicators in the Municipality of El Affroun (ARMA-Based Approach)

Interview-Based Data Collection

To evaluate the maturity of records governance within the local administrative apparatus, this study employed a **qualitative** empirical approach based on semi-structured interviews. The interview method was selected as the primary data collection tool due to its capacity to capture detailed, context-specific insights into institutional practices, organizational structures, and managerial perceptions related to records management.

Interview Design

The interview instrument was specifically designed to support an evaluative assessment of records governance maturity in accordance with the framework developed by ARMA International.

A case study approach was adopted, focusing on the Municipality of El Affroun in Blida Province (Algeria). This municipality was selected as a representative local administrative unit, enabling an in-depth analysis of records management practices within a real institutional setting.

The primary respondent was the Secretary-General of the municipality, who holds a permanent administrative position and is directly involved in overseeing archival and records management functions. This ensured the reliability and relevance of

the collected data, as the respondent possesses both operational and strategic knowledge of the institution's records management system.

Selection of Governance Indicators

The ARMA Information Governance framework identifies eight core principles for evaluating governance maturity. However, for the purpose of this study, a focused analytical approach was adopted by selecting four key principles that are most directly relevant to records management practices.

This selection is consistent with prior empirical research, particularly the study conducted at the Graduate School of Management in Geneva (Pagnamenta, 2014), which applied a similar methodological approach in assessing information governance maturity.

The selected principles are as follows:

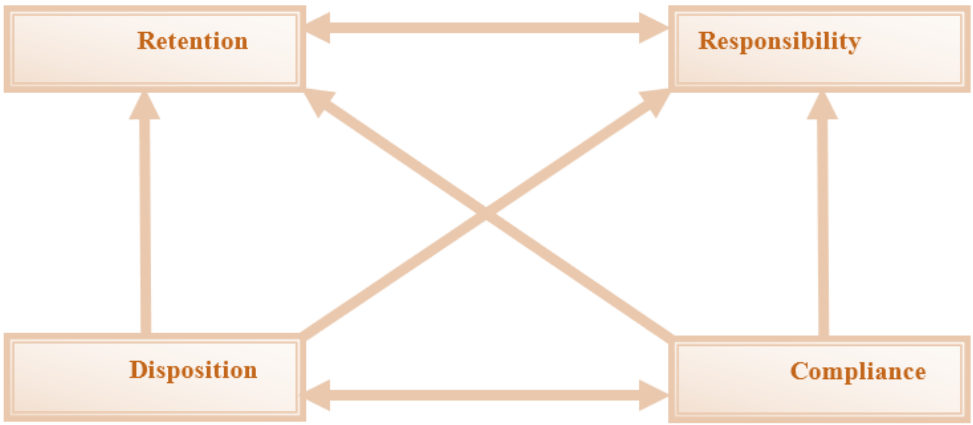
- Responsibility: Refers to the clear assignment of roles and accountability for records management processes. Without defined responsibilities, effective governance and control mechanisms cannot be established.
- Compliance: Relates to adherence to legal, regulatory, and institutional requirements governing records and information management.
- Retention: Concerns the preservation of records over appropriate time periods, ensuring the continuity of institutional memory and legal evidence.
- Disposition: Involves the systematic and secure disposal of records that are no longer required, based on predefined retention policies and legal frameworks.

Analytical Rationale

These four principles were selected due to their strong interdependence and their foundational role in establishing effective records governance systems. In particular, **Responsibility** and **Compliance** are considered core pillars, as they provide the structural and regulatory basis necessary for implementing retention and disposition mechanisms.

Together, these principles enable a comprehensive yet focused evaluation of governance maturity, capturing both organizational capacity and procedural effectiveness in records management.

Figure 1. The four selected principles from the ARMA governance maturity model



The interview questions were divided into two parts:

- The first part included four (04) questions addressed to the Secretary-General.
- The second part included sixteen (16) questions addressed to the head of the archives department in the same municipality.

Secondly: Interview Analysis

In the following, we will present and analyze the interview data to assess the maturity of records governance.

First: Presentation of Interview Results According to the ARMA Information and records Governance Maturity Model

The results of the interview responses are shown in the table below.

Table 3. Quantitative Analysis: Results of Interview Responses

Maturity Level	Question	Level 1	Level 2	Level 3	Level 4	Level 5	Average Question Levels
Responsibility	A		X				1.75
	2	X					
	1		X				
	B		X				
Compliance	5 and 6		X				3
	7		X				
	3 and 4				X		
	C				X		
Retention	11 and 12		X				2.25
	8 and 13		X				
	10			X			
	D		X				
Disposition	14 and 15			X			2.66
	16			X			
	9		X				

Qualitative Analysis. Analysis of the Principle of Responsibility

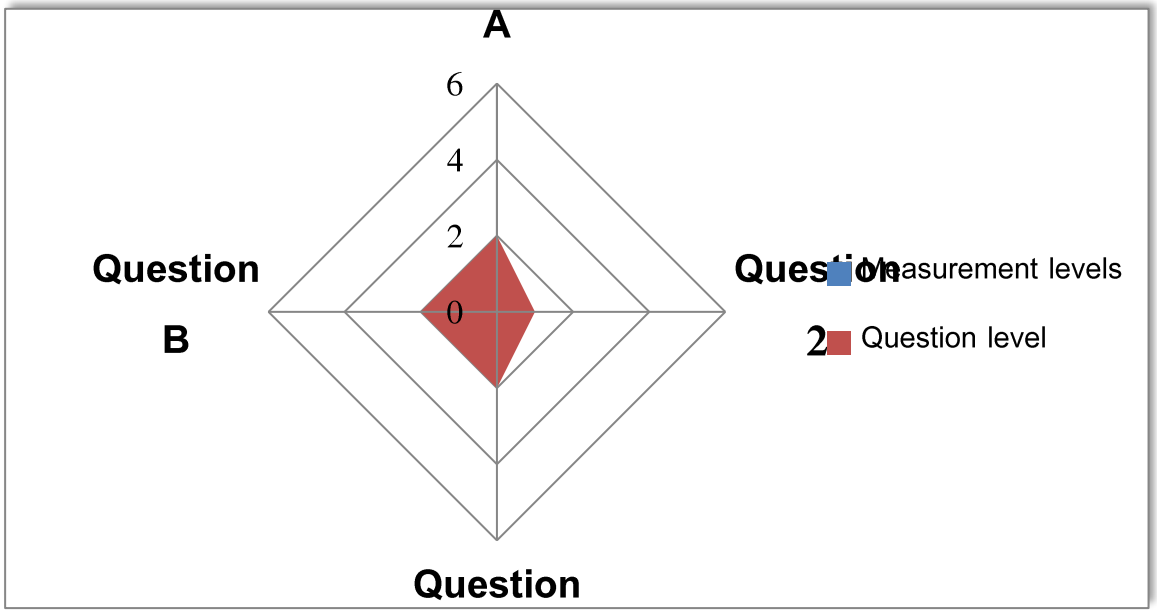


Figure 2. Level of Responses to Questions Related to the Principle of responsibility

The principle of Responsibility is very important and fundamental. One of its key indicators is the necessity of appointing a person responsible for records management. This role greatly contributes to controlling processes and ensuring proper governance. The records manager is expected to enforce control over documents and establish an effective records

governance policy, ensuring proper handling of all records produced and received by the municipality in the course of its normal activities.

According to ARMA, the principle of Responsibility aims to define roles and responsibilities related to information and records governance, as well as to establish procedures that enable the implementation of governance programs.

In other words, the individual responsible for records management plays a proactive role by enforcing strict procedures and precise working methods among relevant staff.

Additionally, the organization should adopt appropriate policies and procedures to guide employees in handling and managing records.

This position should ideally be placed at a high level within the municipal organizational structure to ensure legal authority in proposing effective records management policies.

It is also advisable to establish a records governance committee responsible for evaluating and guiding records management practices and ensuring alignment with strategic objectives.

The main indicators of this principle, presented to the Secretary General of AFfroun Municipality, included four questions addressing structural, regulatory, and communication aspects.

The findings revealed that there is no dedicated records manager; instead, an archivist oversees both the archives and library services. However, there is a general willingness to organize records across departments, and no procedures contradict records management guidelines.

Despite these efforts, the average score for this principle is **1.75**, which does not reach even the second level according to ARMA standards, and is therefore insufficient.

A. Analysis of the Principle of Compliance

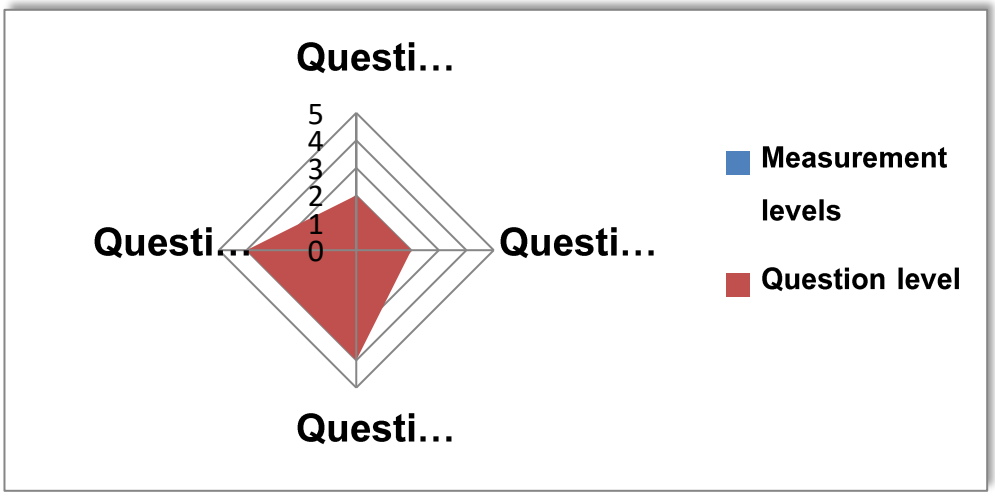


Figure 3. Level of answers to questions related to the principle of compliance

The compliance principle is essential in any organization, as it measures adherence to laws, regulations, and internal policies in daily operations. According to ARMA, records management systems must comply with applicable archival laws and align with organizational policies. Failure to comply with laws such as Law 88-09 and other regulations inevitably leads to organizational issues, including disorganized procedures and ineffective tools. The collected data shows increasing awareness of legal compliance, especially since the archivist is professionally qualified in library and information science. It also relies on an internal classification plan based on the organizational structure of the municipality to organize payments, which have recently been carried out in a more structured manner, while rejecting unorganized and non-preplanned payments. We also observed that the work within the department is entirely manual (100%), with no existing database for tracking the available balance. This was explained by the fact that the work is still in its early stages and that efforts are underway to reorganize and develop this department. The reasons were attributed to a shortage of supporting human resources and the lack of specialized training in this field. The average level of the questions related to this principle is 3, which indicates the existence of the minimum level required to meet legal and regulatory requirements

B. Analysis of the Principle of Retention

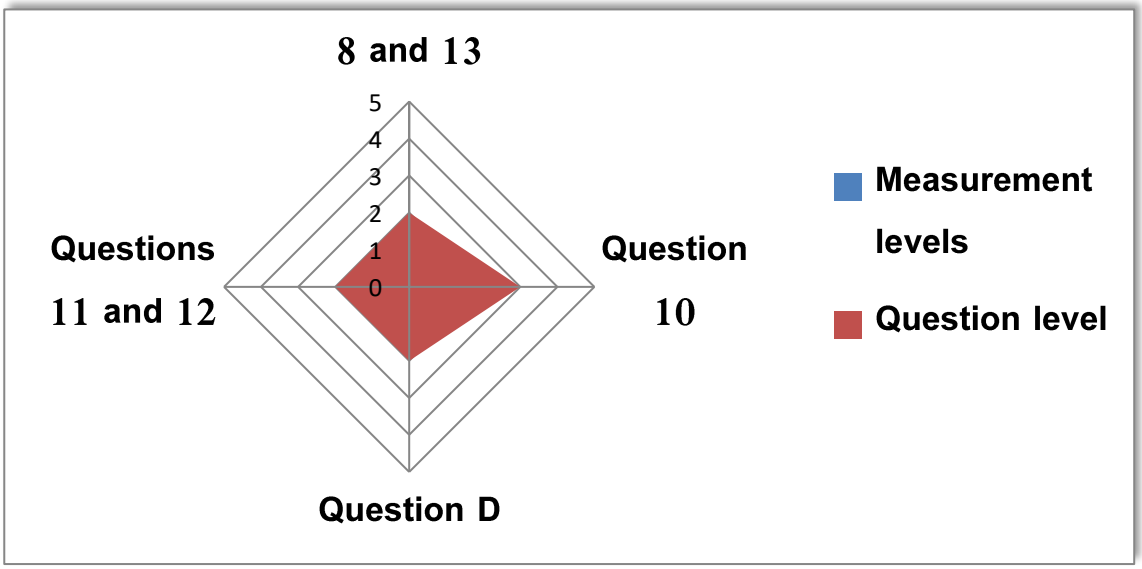


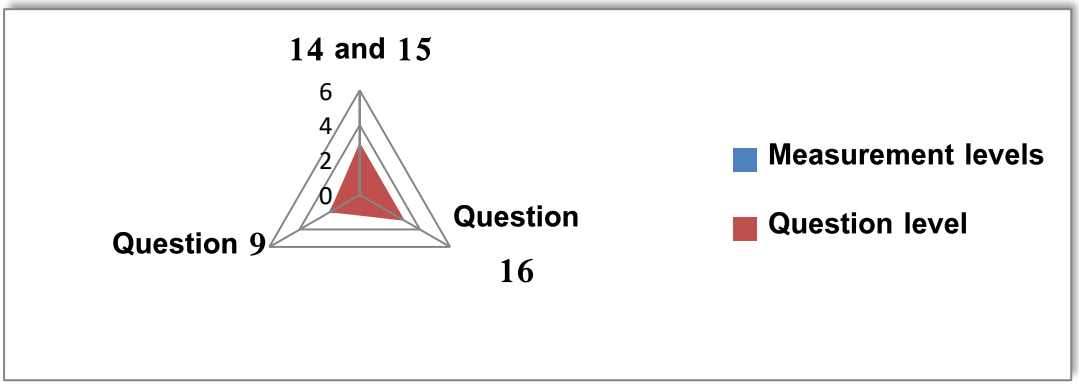
Figure 4. Level of Responses to Questions Related to the Principle of retention

Retention refers to preserving records and ensuring their integrity for future use. It is a cornerstone of records governance.

ARMA defines retention as maintaining records for appropriate periods based on legal, financial, operational, and historical requirements. Proper retention requires suitable storage conditions and tools. A key instrument is the records retention schedule, which determines how long records should be kept and their final disposition. Although a retention schedule specific to municipalities is under development, delays persist. The archivist currently relies on the provincial retention schedule. Storage conditions remain inadequate: poor ventilation, humidity issues, and limited fire protection. The average score for this principle is **2.25**, indicating it is still under development.

C. Analysis of the Principle of Disposition

Figure 5. Level of Responses to Questions Related to the Principle of disposition



According to ARMA, organizations must establish clear and documented rules for the secure disposal of records that are no longer needed. Disposition involves identifying records eligible for destruction while avoiding accidental loss of important files. Regulations require that disposal be conducted by authorized committees and in accordance with legal frameworks. Due to the absence of a finalized retention schedule, disposal processes are currently difficult to implement. The average score for this principle is **2.66**, also indicating a developmental stage.

E. Gap Analysis Between Current Results and ARMA Maturity Levels

After analyzing the maturity level of records governance at the El Affroun municipality using the four previously selected principles, we will now attempt to conduct a gap analysis to identify the difference between the current situation and the desired one. Based on the above, the indicators of the four principles can be summarized as follows:

- A records management officer must be appointed, responsible for defining clear policies and rules for records management.

- A program must be established to ensure compliance with applicable laws, policies, and records management standards.
- The organization must retain its records and information for an appropriate period, taking into account legal, regulatory, financial, and historical requirements.
- The organization must provide clear, documented, justified, and easy-to-apply rules for the secure and appropriate destruction of records and information, as well as those selected for disposal in accordance with laws, standards, and institutional policies.

Accordingly, the gap between the achieved level of these principles and the desired level (limited here to Level 4) can be illustrated in Figure (05), which represents the current level (in red) and the target level (in green). This gap makes it possible to identify priorities in terms of the actions that need to be taken, thereby enabling the development of a clear roadmap of priorities and measures required to improve the records management system at the El Affroun municipality.

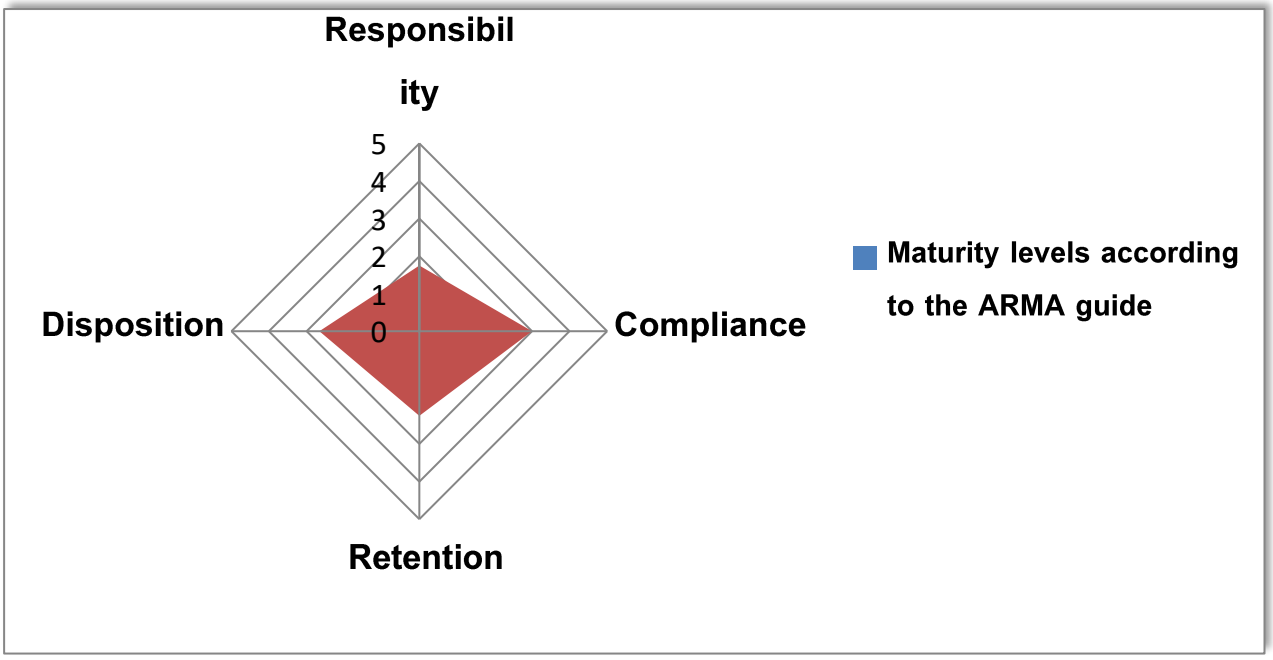


Figure 6. Gap Between the Average Results of the Obtained Principles and the Levels of Records Governance Maturity Measurement According to the ARMA International Guide

Accordingly, we can state that the level of records governance at the El Affroun municipality is classified as **below average**.

(Table 4, Gap Between the Current Level and the Target Level According to the ARMA International Guide)

Principle	Current Level	Target Level	Gap
Responsibility	1,75	4	2,25
Compliance	3	4	1
Retention	2,25	4	1,75
Disposition	2,66	4	1,34

Results

The analysis of the maturity assessment () reveals several critical gaps in the implementation of records governance within the Municipality of El Affroun. Among the four evaluated principles, Responsibility demonstrates the most significant discrepancy between the current and desired maturity levels. This gap is primarily attributed to the absence of a formally designated records management officer responsible for overseeing and coordinating records-related activities.

Currently, responsibility for records management is largely centralized in the role of the archivist, who manages document flows both within administrative departments and between operational units and archival services. However, this arrangement lacks the structural clarity and accountability required for effective governance. The findings suggest that appointing a

dedicated records management officer is essential to ensure systematic supervision, coordination, and implementation of records management procedures.

The second most critical gap is observed in the Retention principle. The absence of a formally implemented records retention schedule represents a major structural deficiency. Despite being a fundamental requirement under international standards—particularly ISO 15489—this tool has not yet been fully developed or operationalized within the municipality. The retention schedule is essential for regulating the lifecycle of records, defining retention periods, and identifying responsible custodians, thereby reducing risks associated with premature disposal or uncontrolled accumulation of documents.

The average maturity gap across the four evaluated principles is calculated at 1.58, which corresponds approximately to Level 2 (Development Stage) within the ARMA maturity framework. This level reflects an environment characterized by emerging awareness of the importance of records management, yet lacking formalized structures, standardized procedures, and institutionalized governance mechanisms.

Overall, the findings indicate that the Municipality of El Affroun is still in a transitional phase, where recognition of the strategic value of records is increasing, but practical implementation remains limited. Employees engage with records on a daily basis; however, their understanding of proper management practices is often insufficient and largely dependent on direct supervision rather than systematic training or institutional policy.

Furthermore, the analysis highlights significant risks associated with non-compliance. Only a limited number of departments demonstrate partial adherence to legal and regulatory requirements. This is particularly evident in the absence of key operational tools, such as the records retention schedule, which is essential for ensuring compliance and accountability.

The results also reveal a broader structural issue: the lack of a comprehensive and coherent records governance framework. The municipality currently operates without a clearly defined records management policy, standardized workflows, or appropriate technological tools. In addition, there is minimal reliance on internationally recognized standards and best practices in records and archival management.

6. Conclusion

This study confirms that records governance represents a contemporary and strategic approach to managing documentary and informational resources within an integrated framework grounded in efficiency, accountability, and institutional control.

By applying the ARMA Information Governance Maturity Model to the case of the Municipality of El Affroun, the study provides an empirical assessment of the current state of records management within local administrative systems in Algeria. The findings demonstrate that, despite increasing awareness of the importance of records, the existing system remains underdeveloped and does not meet the requirements of international standards, particularly ISO 15489.

The study highlights that the establishment of an effective records governance system requires a comprehensive institutional transformation. This includes the development of clear policies, the implementation of standardized procedures, the adoption of appropriate technological solutions, and the alignment with international records management standards.

A key conclusion of this research is that successful records governance depends on the creation of a collaborative and integrated environment involving all stakeholders in the archival sector. Such an environment should support strategic planning, continuous monitoring, and systematic evaluation of records management practices.

Moreover, the findings underscore the urgent need to establish specialized governance structures, including the designation of records management officers and the creation of supervisory bodies responsible for monitoring compliance and performance.

In its current state, the local administrative apparatus—represented by municipalities and provincial authorities—does not yet fulfill the fundamental requirements of modern records governance systems. Therefore, comprehensive reforms are necessary to enhance institutional capacity, improve administrative efficiency, and ensure the long-term preservation and effective use of documentary resources.

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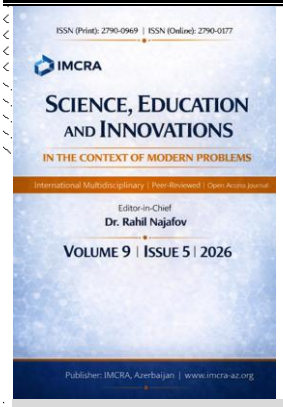
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RESEARCH ARTICLE

Transformation of Modern Universities in the Global Knowledge Economy: Challenges in Teaching, Scientific Activity, Communication Strategies, and the Emerging Paradigms of Academic Development

Zahid Farrukh Mamedov
Doctor of Economic Sciences, Professor
Azerbaijan State University of Economics - UNEC
Azerbaijan
Email: prof.zahid.mamed@gmail.com; https://orcid.org/0000-0001-6425-8690

Shafa Aliyev
Doctor of Economic Sciences, Professor
Sumgait State University
Azerbaijan
E-mail: shafa.aliyev@sdu.edu.az
https://orcid.org/0000-0002-4997-7563

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Abstract

Developmental dyslexia in Arabic-speaking children presents unique challenges due to the structural and orthographic characteristics of the Arabic language, particularly the role of vowel diacritics in phonological decoding. Existing intervention models, primarily designed for Indo-European languages, often do not adequately account for these language-specific features. This study introduces *Smart Phono-Memory (SPM)*, an adaptive digital tool designed to support phonological processing through the integration of phonological awareness training, working memory activation, and controlled manipulation of vowelized and non-vowelized stimuli. In parallel, the study proposes the *Diacritic-Gated Phonological Access (DGPA)* model, which reconceptualizes diacritic processing as a central regulatory mechanism in Arabic reading. The proposed framework emphasizes the interaction between orthographic transparency and cognitive processing, highlighting how diacritic cues influence the stability of phonological representations. It further explores the relationship between phonological awareness and working memory as interdependent components in the decoding process. The adaptive nature of the SPM system allows for individualized progression, aligning task complexity with the learner's cognitive profile and reducing processing overload. In addition, the study situates Arabic reading within a broader cognitive-linguistic context, underscoring the importance of language-specific variables in literacy development. The integration of digital technology with theoretical modeling offers a novel perspective on intervention design, bridging the gap between cognitive theory and applied educational practice. The findings contribute to an emerging body of research advocating for culturally and linguistically responsive approaches in dyslexia intervention. By situating phonological processing within a language-specific cognitive framework, this work advances the theoretical understanding of Arabic reading acquisition and highlights the importance of adaptive, linguistically grounded digital interventions for addressing dyslexia in non-European orthographies.

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Introduction

In the context of rapid globalization, technological advancement, and the transition toward a knowledge-based economy, universities are undergoing profound structural and functional transformations. Traditionally regarded as institutions for the

transmission of knowledge, modern universities are increasingly expected to act as dynamic agents of innovation, economic development, and social change. This transformation is driven by multiple interrelated factors, including digitalization, internationalization, marketization of education, and the growing demand for highly skilled human capital (Altbach, 2016; Marginson, 2022).

Over the past decades, the role of universities has expanded significantly beyond their classical missions of teaching and research. Contemporary higher education institutions are now deeply embedded in global knowledge networks, actively contributing to technological innovation, entrepreneurship, and policy development. The emergence of concepts such as the "knowledge triangle" (education–research–innovation) and the Triple Helix model (university–industry–government interaction) reflects the increasing complexity of university functions in modern societies (Etzkowitz & Zhou, 2017; Mamedov, 2018).

At the same time, universities face numerous challenges that question the sustainability of traditional academic models. Among these challenges are the decline of deep learning practices, the growing dominance of digital information sources, the erosion of universities' monopoly over knowledge production, and the intensification of global competition through rankings and publication metrics (OECD, 2022; Mok & Jiang, 2023). In particular, the increasing emphasis on scientometric indicators and the "publish or perish" paradigm has significantly reshaped academic behavior, often prioritizing quantity over quality in research outputs (Hicks et al., 2015).

Furthermore, the teaching process itself is undergoing substantial transformation. Modern students, influenced by digital technologies and new cognitive environments, demand more interactive, flexible, and practice-oriented learning approaches. Traditional lecture-based models are increasingly criticized for their inefficiency in addressing diverse learning needs and fostering critical thinking skills (Freeman et al., 2014; Carr, 2010). Consequently, universities are required to rethink pedagogical strategies, integrate research into teaching, and adopt innovative educational technologies.

In parallel, the scientific activities of universities are being restructured to align with market-oriented and innovation-driven frameworks. The commercialization of research, development of technology transfer mechanisms, and integration with industry are becoming central components of university strategies. This shift reflects the broader transformation of universities into hybrid institutions that combine academic, economic, and entrepreneurial functions.

Given these developments, the present study aims to analyze the evolving role of universities in the modern era, focusing on new challenges in teaching processes, transformations in scientific activity and publishing policies, and the emergence of new paradigms in higher education. The study seeks to answer the following key research questions:

1. How are modern universities adapting to technological and societal transformations?
2. What are the main challenges facing teaching and learning processes in contemporary higher education?
3. How do current scientific publishing policies influence academic behavior and research quality?
4. What new paradigms are shaping the future development of universities?

By addressing these questions, the study contributes to a deeper understanding of the transformation of higher education systems and provides insights into the future trajectories of universities in the global knowledge economy.

Methodology

This study employs a qualitative research design based on a systematic review and analytical synthesis of academic literature, combined with comparative and conceptual analysis. The methodology is designed to explore the transformation of universities from multiple perspectives, including teaching processes, scientific activity, and institutional development.

Research Design

The research adopts an interpretive and exploratory approach, which is appropriate for examining complex and evolving phenomena such as higher education transformation. The study integrates theoretical frameworks and empirical findings from international research to develop a comprehensive understanding of the subject.

Data Sources and Selection Criteria

The analysis is based on a wide range of sources, including:

- Peer-reviewed journal articles indexed in Web of Science and Scopus;
- Reports from international organizations such as the OECD and the World Bank;
- Academic monographs and conference proceedings;
- Policy documents and analytical reports on higher education systems.

The selection of sources was guided by the following criteria:

1. Relevance to higher education transformation, university governance, and academic publishing;

2. Scientific credibility, with preference given to high-impact journals and recognized academic publishers;

3. Recency, particularly focusing on publications from the last decade, while also incorporating foundational theoretical works.

Analytical Methods

Several complementary methods were employed:

1. Systematic Literature Review

A structured review of existing literature was conducted to identify key trends, concepts, and debates in higher education. This method enabled the identification of recurring themes such as digitalization, globalization, and the commercialization of research.

2. Comparative Analysis

The study compares different models of university development (e.g., European, American, and Asian systems) to highlight similarities and differences in institutional strategies and outcomes.

3. Conceptual Analysis

Key theoretical frameworks, including the knowledge economy, Triple Helix model, and research university paradigm, were analyzed to provide a conceptual foundation for the study.

4. Case-Based Illustrations

Empirical examples from leading universities (e.g., MIT, Stanford, Tsinghua University) were used to illustrate practical implementations of theoretical concepts. These examples demonstrate how universities adapt to global challenges through innovation, research integration, and industry collaboration.

Limitations of the Study

While the study provides a comprehensive overview of contemporary trends, it is subject to certain limitations:

- The reliance on secondary data may limit the ability to capture real-time institutional dynamics;
- The qualitative nature of the analysis does not allow for statistical generalization;
- Differences in national contexts may affect the applicability of findings across regions.

Despite these limitations, the study offers valuable insights into the transformation of universities and contributes to the ongoing academic discourse on higher education reform.

Universities are not only recognized as educational institutions but also as major research centers, increasingly characterized by specialization. In addition to educating individuals, universities conduct extensive and diverse scientific research. Their reputation is largely determined by their scientific achievements. Consequently, the attractiveness of an educational institution, as well as the value of education (including tuition fees), is directly linked to its scientific status and research outcomes. In economically developed countries, profound transformations are occurring in higher education systems. These transformations are closely associated with the growing role of universities in driving innovation and economic growth. This implies a redefinition of their socio-economic functions: in addition to traditional educational and research missions, universities are now actively engaged in economic activities. These include the development and transfer of technologies, commercialization of academic research outputs, creation of new businesses, and the management of intellectual property for revenue generation. Experience shows that the abundance of natural resources is not the primary indicator of societal development; rather, the key factor is the transformation of these resources into human capital—the main driving force of society. At the current stage, this represents one of the most critical tasks of the higher education system. Countries such as the United States, Japan, and South Korea have achieved significant economic gains not from their material resources, but from the human capital developed through their education systems. The contemporary development model based on the knowledge economy particularly emphasizes the commercialization of scientific potential and research outputs within higher education. In the modern era, universities act as key players in the global knowledge services market, occupying leading positions in advanced knowledge production and creative intellectual activities. In this context, governments around the world increasingly recognize that their leading universities must be at the forefront of global intellectual and scientific progress. Universities are centers of knowledge production, and the knowledge generated within them significantly influences legal, social, and economic decision-making processes. For this reason, in Western universities, representatives of the social sciences are often referred to as “think tanks” or even a form of “intellectual policy-making bodies” [Mammadov, 2020].

The primary objective of modern higher education institutions should not merely be teaching, but learning. Institutions that do not continuously learn themselves cannot effectively teach others; in other words, an institution that does not engage in self-development cannot successfully educate others.

A review of global patenting activities suggests that, particularly in the field of biotechnology, universities—rather than firms—serve as the main drivers of scientific progress.

In modern universities, scientific activity develops around three primary objectives:

1. **Knowledge production through research:** Universities explore and investigate all areas within the scope of human knowledge;

2. **Integration of research into teaching:** Research outcomes are incorporated into the educational process to prepare future generations;

3. **Meeting labor market demands:** Universities train qualified specialists aligned with the needs of society and, especially, the labor market [Mammadov, 2020].

Thus, one of the most widely debated questions today is whether university research adequately responds to the needs of society and the economy. This article seeks to address this issue.

Historical Development of Universities

The concept of the classical university is traditionally understood as an institution that accumulates, preserves, and transmits universal liberal knowledge over long periods. The development and institutionalization of this classical idea took shape primarily in the nineteenth and twentieth centuries through various higher education models. Among these were the liberal education model—often associated with the British residential (collegiate) system—as well as later developments such as the Chicago model in the United States and the *Grande École* model in France. Each of these models shared a common objective: the formation of an elite intellectual and cultural stratum within society.

However, it should be noted that neither the *Grande École* model nor the traditional liberal education model achieved full global recognition as leading academic paradigms. One of the main reasons for this was the limited emphasis on rigorous scientific research within these systems, which reduced their capacity to exert a strong and legitimate influence on intellectual development. In contrast, within European debates on educational reform, the German model of the research-oriented university emerged as dominant. In the nineteenth century, German universities achieved remarkable global success in scientific research, a trend that continued until the late 1930s. As a result of the efforts of nineteenth-century German reformers, a new university paradigm—the neoclassical university—was established. Although the German intellectual tradition included many prominent scholars, the name of Wilhelm von Humboldt holds particular significance. Humboldt was not only a theorist but also a practitioner. The University of Berlin, founded in 1810 on the basis of the Prussian Academy of Sciences, was created under his intellectual guidance and vision. In subsequent decades, this institution became a model for the modernization of universities in Germany and beyond.

At the core of Humboldt's university idea was the institutional development of science and the moral and intellectual advancement of society. He argued that truth must be pursued through scientific inquiry, making research a fundamental mission of the university. The transmission of knowledge, combined with the development of the ability to seek truth, ultimately contributes to the moral and intellectual growth of individuals. In contrast, classical (medieval) universities were not centers of knowledge production in the modern sense. They did not prioritize scientific research; rather, their primary function was the preservation of existing knowledge and the teaching of ecclesiastical doctrines. Intellectual activity was largely limited to discussion rather than discovery.

The emergence of the research university—particularly the Humboldtian model, often associated with Enlightenment ideals—marked a fundamental shift. These universities aimed to stimulate scientific thinking among students, encouraging them to understand not only established knowledge but also the processes through which knowledge is discovered. A research university is therefore defined as an institution that effectively integrates scientific research and teaching, conducts advanced research, ensures a high-quality academic environment, and possesses strong scientific and academic staff capacity. In the contemporary era, this model has evolved further into the innovation-oriented university. Such institutions are characterized by close collaboration between universities and industry, as well as by the commercialization of scientific research and knowledge. Within the "education–science–innovation" triangle, science occupies a central role, necessitating a shift away from purely formal and abstract academic activity toward more applied and impact-oriented research. This transformation also requires a rethinking of traditional approaches to managing scientific activity within universities.

Today, universities are increasingly evaluated through the prism of the "education–science–production" triangle. It is widely accepted that science without practical application, education without integration with science, and business without connection to education and research are no longer viable. Empirical evidence supports this view; for instance, it has been noted that more than 80% of the development of leading industries in the United States is linked to innovations originating in universities [Mammadov, 2019].

Thus, the modern university has evolved into a generator of knowledge-intensive technologies and innovations. It actively collaborates with industry, transforms into a producer of knowledge-based goods, creates new employment opportunities, and participates in real market activities through technoparks and startup ecosystems.

The Mission of Modern Universities

The mission of the modern university is to respond to the fundamental question of how to operate effectively under conditions of rapid change. It involves identifying pragmatic approaches, studying problems that affect all spheres of human life within a market economy, analyzing the increasing differentiation of society, and determining the specific role of higher education institutions within these dynamic processes.

In the context of contemporary challenges and the information age, Ronald Barnett summarizes the core missions of the university as follows (Barnett, 1999):

- Expanding communication capacities, promoting interdisciplinary development, fostering intercultural dialogue, engaging new participants in academic processes, and cultivating critical thinking;
- Advancing interdisciplinary research methodologies and ensuring equal opportunities for all stakeholders in education to participate in research activities;
- Shaping the social structure of educational actors and preparing them for innovation;
- Equipping educational participants with new knowledge, enhancing skills and creativity, and developing the ability to make non-standard decisions in conditions of uncertainty.

Modern universities function as research-oriented institutions that simultaneously conduct teaching and scientific inquiry. They serve as intellectual centers that disseminate scientific knowledge to those who seek it while continuously advancing research activities.

New Paradigms in the Development of Universities

World-class universities play a crucial role in global development, contributing to societal well-being and the advancement of civilization as a whole. It is widely recognized that such institutions—regardless of whether they are public or private—employ leading researchers and attract outstanding students from around the world. They actively respond to global trends, challenges, and transformations, while continuously striving to solve pressing global problems and engaging in extensive international collaboration.

One of the most influential conceptual frameworks for understanding university development is proposed by Jamil Salmi (2009), who identifies three key characteristics of world-class universities:

1. Concentration of talent (among faculty, students, and administrators);

2. Abundance of resources (financial and infrastructural);

3. Effective and flexible governance (institutional autonomy, innovative decision-making, and minimal bureaucratic constraints).

These characteristics are reflected in three fundamental functions of universities:

1. Training highly qualified human capital

2. Conducting advanced scientific research

3. Contributing to societal well-being

Key Dimensions of Core University Functions

1. Training Highly Qualified Specialists. This function is characterized by global orientation, excellence, research-based education, professional competencies, innovation, creativity, diversity, motivation, interdisciplinarity, and inclusiveness. World-class universities actively develop strong human capital pools by attracting and nurturing the most talented individuals, thereby providing critical resources at both national and global levels.

2. Scientific Research. Research activities are defined by high standards, global engagement, collaboration and partnerships, originality, knowledge production, and interdisciplinary or transdisciplinary approaches. Leading universities conduct cutting-edge research, contributing to major scientific discoveries and addressing global challenges.

3. Contribution to Societal Well-Being. Universities play a vital role in improving social welfare at local, national, and global levels. Their activities involve cooperation, coordination, and active engagement with various stakeholders, addressing complex societal challenges and contributing to sustainable development and human progress.

In terms of scientific advancement, world-class universities are at the forefront of innovation, producing groundbreaking discoveries and fulfilling global scientific responsibilities. Ultimately, they contribute to solving complex global problems and fostering sustainable development for humanity.

Strategies for Building World-Class Universities

Based on international experience, three primary strategies can be identified for the creation of world-class universities:

1. Upgrading existing institutions – enhancing the capacity of selected universities and transforming them into leading institutions;

2. Merging institutions – combining several universities to create a new entity capable of achieving synergistic development effects;

3. Establishing new universities from scratch – creating entirely new institutions designed to meet world-class standards from the outset.

Each of these strategies has its own advantages and limitations, depending on national context, available resources, and long-term policy objectives.

New Challenges Facing the Teaching Process in Modern Universities: Transformations, Risks, and Empirical Realities

The teaching process in contemporary universities is undergoing profound transformation under the influence of digitalization, globalization, and the changing cognitive patterns of new generations. Traditional pedagogical approaches are increasingly challenged by the need to adapt to dynamic learning environments, technological disruptions, and evolving student expectations.

1. From Passive Knowledge Consumption to Active Learning

As emphasized by David K. Cohen, one of the fundamental challenges in higher education is to move beyond passive knowledge transmission toward active knowledge construction (Cohen, 2017). Students should not merely consume information but internalize and critically engage with it.

Modern empirical studies confirm this shift. For example, research in *Studies in Higher Education* (2022) demonstrates that active learning methods (problem-based learning, flipped classrooms) increase student retention and conceptual understanding by up to 30–40% compared to traditional lecture formats (Freeman et al., 2014; Mok & Jiang, 2023).

Equally important is the diversification of feedback mechanisms. Continuous, multidirectional feedback between students and instructors enhances engagement, learning outcomes, and academic motivation (Hattie & Timperley, 2007).

2. Decline in Deep Reading and the Crisis of Intellectual Engagement

A significant challenge in modern higher education is the declining engagement of students with academic literature. In disciplines such as the social sciences and humanities, where learning is inherently based on interpretation, debate, and critical reflection, the lack of reading undermines the very foundation of knowledge acquisition.

Empirical evidence supports this concern. A large-scale OECD (2022) report indicates that students increasingly rely on summarized digital content rather than comprehensive academic texts, leading to reduced analytical depth. Without sustained engagement with scholarly literature, students struggle to articulate theoretical frameworks or engage in complex argumentation.

3. Integration of Research and Teaching

A core principle of modern higher education is the integration of teaching and research. Professors are expected not only to transmit existing knowledge but also to involve students in ongoing scientific inquiry.

Studies show that research-led teaching significantly enhances students' analytical skills and academic identity (Healey & Jenkins, 2009). For example:

- At Massachusetts Institute of Technology, undergraduate students participate in the UROP (Undergraduate Research Opportunities Program), contributing directly to faculty research projects.
- At Stanford University, students are encouraged to engage in interdisciplinary research labs from early stages of their education.

Such practices demonstrate that transparency in research processes—"opening the laboratory"—is essential for effective teaching. Educators must present not only results but also the logic, challenges, and methodology behind their research.

4. Development of Academic and Critical Thinking Skills

Academic competencies remain central to university education. These include critical thinking, analytical reasoning, and the ability to identify and solve complex problems.

However, modern cognitive environments pose new risks. The phenomenon often described as the "Google effect" or "digital dependency" has fundamentally altered how individuals process information (Sparrow et al., 2011). Instead of deep cognitive engagement, individuals increasingly rely on external digital systems for information retrieval.

While digital tools improve accessibility, they also reduce cognitive effort and weaken critical thinking abilities (Carr, 2010). In contrast, traditional academic reading—particularly engagement with theoretical and encyclopedic knowledge—remains crucial for developing structured and reflective thinking.

5. Transformation of the Lecture Model

The traditional lecture format is increasingly losing its effectiveness. Contemporary students, shaped by digital environments, exhibit lower tolerance for long, monologic presentations. Instead, they demand interactive, dialogic learning experiences.

Table 1. Key Transformations and Challenges in Modern Universities

Dimension	Traditional Model	Modern Transformation	Key Challenges	Implications
Teaching Process	Lecture-based, teacher-centered	Interactive, student-centered, research-led learning	Decline in deep reading; reduced attention span; digital dependency	Need for active learning, critical thinking development
Knowledge Production	Limited to academic institutions	Distributed across digital platforms and global networks	Loss of monopoly over knowledge; competition from online platforms	Universities must redefine their role as knowledge hubs
Scientific Activity	Individual, discipline-based research	Interdisciplinary, collaborative, innovation-driven research	Overemphasis on publication metrics; fragmentation of research	Integration of research with teaching and societal needs
Academic Publishing	Quality-oriented, limited outputs	"Publish or perish" culture; high-volume production	Declining quality; pressure on researchers; topic convergence	Shift toward balanced evaluation (quality + impact)
Governance and Management	Centralized, bureaucratic	Flexible, autonomous, innovation-oriented	Administrative complexity; lack of agility	Need for adaptive and strategic governance models
University–Industry Relations	Weak or indirect links	Strong collaboration; commercialization of research	Risk of over-commercialization; ethical concerns	Development of "scientific logistics" and innovation ecosystems
Communication	Limited public engagement	Active communication via digital platforms	Spread of misinformation; weak academic outreach	Universities must strengthen science communication strategies
Internationalization	National focus	Global integration; mobility; partnerships	Language barriers; inequality between institutions	Expansion of global networks and collaboration
Language of Instruction	National languages	Dominance of English (EMI)	Cultural erosion; inequality for non-native speakers	Need for multilingual and inclusive academic policies

Table 2. Strategic Pathways and Core Functions of World-Class Universities

Category	Components	Key Characteristics	Empirical Examples	Expected Outcomes
Core Functions	Human Capital Development	High-quality, research-based education; global competencies; innovation skills	MIT (USA), University of Oxford (UK)	Highly skilled graduates; global workforce competitiveness
	Scientific Research	Advanced, interdisciplinary, high-impact research	Stanford University (USA), Tsinghua University (China)	Breakthrough innovations; scientific leadership
	Societal Contribution	Engagement with society; policy impact; sustainable development	University of Cambridge (UK), National University of Singapore	Improved social welfare; policy influence

Strategic Pathways	Upgrading Existing Institutions	Investment in top universities; talent concentration	China's "Double First-Class" initiative	Rapid improvement in global rankings
	Institutional Mergers	Combining universities for synergy	Aalto University (Finland)	Increased efficiency and research capacity
	New University Creation	Establishing institutions from scratch	KAUST (Saudi Arabia)	Fast-track development of world-class universities
Key Success Factors	Talent Concentration	Attraction of top faculty and students	Harvard University (USA)	Academic excellence and innovation
	Resource Availability	Strong financial and infrastructural support	ETH Zurich (Switzerland)	Sustainable research ecosystems
	Governance Flexibility	Institutional autonomy and strategic leadership	National University of Singapore	Efficient decision-making and adaptability
Risks and Limitations	Over-commercialization	Excessive focus on profit-oriented research	Global trend	Potential loss of academic independence
	Metric Dominance	Overreliance on rankings and citations	QS, THE rankings influence	Distortion of research priorities
	Language Inequality	English dominance in academia	Non-English-speaking countries	Barriers to participation and publication

As noted by Benjamin Barber, students today prefer "conversation over lecture." Empirical studies confirm that:

- Students' attention spans in traditional lectures decline significantly after 15–20 minutes (Bligh, 2000);
- Interactive formats increase engagement and satisfaction (Prince, 2004).

Furthermore, lectures are inherently limited by heterogeneity in cognitive abilities and learning speeds. A single teaching pace cannot effectively serve all students, leading to unequal learning outcomes.

Digital learning environments provide an alternative. Platforms such as Coursera and edX allow students to learn at their own pace, revisiting materials as needed. During the COVID-19 pandemic, universities worldwide adopted hybrid and online models, demonstrating the scalability and flexibility of such approaches (World Bank, 2020).

6. Erosion of Universities' Monopoly over Knowledge

Historically, universities held a monopoly over knowledge production and dissemination. However, in the information age, this monopoly is rapidly eroding.

According to Alvin Toffler, the information revolution redistributes power across institutions, including universities (Toffler, 2009). Today:

- Knowledge is widely accessible through digital platforms;
- Academic content is available via open-access journals and repositories;
- Alternative education providers (e.g., MOOCs, private training platforms) compete with traditional universities.

This transformation challenges the relevance of traditional university structures and requires a redefinition of their role in knowledge ecosystems.

7. Structural Inefficiencies of Traditional Universities

Critiques of traditional universities highlight systemic inefficiencies. Sebastian Thrun, founder of Udacity and former Stanford professor, characterized traditional higher education as "slow, inefficient, and expensive."

Empirical data supports this diagnosis:

- Tuition costs have risen significantly, especially in the United States (OECD, 2022);
- Administrative complexity reduces institutional agility (Deem & Brehony, 2022);
- Traditional teaching models often fail to meet labor market demands.

8. Scientific Activity and Research Management in Universities

Modern universities are complex research ecosystems. Their scientific activity encompasses multiple interconnected components:

- Research funding and project management
- University–industry collaboration
- Technology transfer and commercialization
- Management of research centers and laboratories
- Academic publishing and journal systems
- Research evaluation (scientometrics) and academic ethics

The process of generating scientific knowledge typically follows a structured progression:

1. Conference presentations (initial dissemination of ideas)
2. Academic articles (peer-reviewed validation)
3. Monographs (comprehensive theoretical contributions)
4. Textbooks (integration into teaching processes)

However, modern evaluation systems increasingly rely on quantitative indicators such as publication counts and citation metrics. While useful, these indicators have limitations.

For example, Nobel laureate Edward B. Lewis had relatively few publications and a modest h-index, yet made groundbreaking contributions to science. This illustrates that scientometric indicators should serve as supplementary tools rather than primary evaluation criteria.

Scientific Publishing Policies in Universities: Pressures, Transformations, and Emerging Paradigms

In recent decades, one of the defining features of academic life has been the increasing importance of publishing both educational materials (textbooks, teaching guides, methodological manuals) and scientific outputs (journal articles, conference papers, monographs).

While the primary mission of university faculty remains teaching, academic careers are now heavily shaped by formal and informal publication requirements. These pressures significantly influence professional development, institutional status, and career advancement trajectories.

1. The Rise of the "Publish or Perish" Paradigm

In leading universities, particularly in systems such as the United States, securing tenure has become increasingly difficult. Faculty members are required to publish in top-tier journals to obtain long-term contracts and career stability (Altbach, 2016; Merton, 1973).

Conversely, in many institutions, the dominant norm is the principle of "publish or perish", where quantity often outweighs quality. This phenomenon has been widely criticized in the literature. As noted by Sabine Siebert, the academic publishing system increasingly prioritizes volume over intellectual contribution (Siebert, 2018).

Empirical studies confirm this trend:

- The global number of scientific publications has grown exponentially, doubling approximately every 9–12 years (Bornmann & Mutz, 2015);
- However, citation concentration shows that a small proportion of articles receive the majority of citations, indicating uneven quality distribution (Larivière et al., 2015).

This imbalance raises concerns about the sustainability and integrity of academic knowledge production.

2. Elite Journals and Artificial Scarcity

Publishing in high-impact journals such as Nature, Science, and Cell remains a central goal for researchers. Such publications often determine access to research funding, academic promotions, and global recognition.

However, these journals maintain limited publication capacity, creating what scholars describe as an "artificial scarcity" in scientific publishing. This phenomenon was analyzed by Neal Young and colleagues, who referred to it as the "winner's curse"—where only a small number of highly visible publications dominate academic prestige.

Recent bibliometric analyses confirm that:

- Acceptance rates in top journals are often below 10%;

- Editorial selection processes are influenced not only by quality but also by novelty, trend alignment, and citation potential (Brembs, 2018).

This creates systemic inequalities and biases in knowledge dissemination.

3. Impact on Academic Behavior and Research Agendas

The pressure to publish affects not only output volume but also the direction and nature of research. Scholars increasingly align their research topics with trends that are more likely to be published in high-impact journals.

This leads to several structural consequences:

- Topic convergence: Researchers focus on "fashionable" topics rather than fundamental or locally relevant issues;
- Risk aversion: Innovative but uncertain research is avoided;
- Fragmentation of knowledge: Research outputs are divided into multiple smaller publications ("salami slicing") (Fanelli, 2010).

Moreover, early-career researchers often internalize the belief that their primary goal is not the pursuit of truth but the accumulation of publications—a shift that can undermine academic integrity.

4. Rankings, Metrics, and the Quantification of Science

Modern universities operate within a global ranking system that heavily relies on publication indicators. Rankings such as QS World University Rankings and Times Higher Education prioritize metrics such as:

- Number of publications
- Citation impact
- h-index and related indicators

While these metrics provide useful benchmarks, they have significant limitations. As argued by Hicks et al. (2015) in the Leiden Manifesto, overreliance on bibliometric indicators distorts research priorities and undervalues qualitative contributions.

Empirical evidence shows that:

- Universities actively increase publication output to improve rankings;
- In some cases, quality is sacrificed to achieve higher quantitative indicators (Moed, 2017).

5. Commercialization and the Emergence of "Scientific Logistics"

A key transformation in modern universities is the shift toward commercialization and application of research results. The concept of "scientific logistics" refers to the systematic organization of research processes, including:

- Knowledge production
- Technology transfer
- Market integration
- Commercialization of innovations

This aligns with the Triple Helix model (Etzkowitz & Zhou, 2017), where universities, industry, and government collaborate to drive innovation.

Empirical examples include:

- Stanford University, which has generated thousands of startups, including companies such as Google;
- University of Cambridge, whose innovation ecosystem ("Cambridge Cluster") contributes billions to the UK economy;
- Tsinghua University, which plays a central role in China's high-tech industrial development.
- These examples demonstrate that universities are evolving into knowledge-producing corporations, integrating research, innovation, and market activity.

6. Limitations of Scientometrics and the Need for Qualitative Evaluation

Although scientometric indicators (e.g., citations, h-index) are widely used, they should not be the sole basis for evaluating scientific performance.

Historical cases illustrate their limitations. For instance, Nobel laureate Edward B. Lewis had relatively low publication metrics but made transformative contributions to developmental biology.

Scholars argue that evaluation systems should include:

- Peer review and expert assessment
- Societal impact of research
- Long-term scientific significance (Bornmann, 2013)

7. Transformation of Academic Identity and Professional Roles

The modern academic is no longer only a teacher and researcher but also:

- A grant seeker
- A project manager
- An innovation entrepreneur
- A global knowledge network participant

This transformation requires new competencies, including digital literacy, interdisciplinary collaboration, and the ability to manage research ecosystems. Furthermore, virtual academic presence (e.g., ORCID, Google Scholar, ResearchGate profiles) has become a critical component of professional reputation.

8. Toward a New Paradigm: From Quantity to Quality

The current trajectory of higher education suggests a transition toward a new paradigm in which:

- Quality of research is prioritized over quantity
- Interdisciplinary and socially relevant research gains importance
- Ethical standards and transparency are strengthened
- Universities balance academic values with market pressures

However, the question of how to overcome the dominance of the "publish or perish" model remains open.

University Communication Policy

We are living in an era in which scientific knowledge is increasingly being questioned, while misinformation and disinformation are spreading rapidly and widely. Social media platforms play a central role in the dissemination of misleading information. In this context, universities and scholars must develop the capacity to communicate research findings effectively to broader audiences in an engaging and accessible manner.

It is also essential to recognize that deliberately distorted information can have negative consequences for both individual and collective behavior. Addressing this challenge is a complex task. Therefore, in the process of disseminating accurate information, it is crucial to inform the public about existing misinformation and false narratives surrounding specific issues. This involves identifying ideological biases, reducing uncertainty, and supporting individuals in making informed decisions. Promoting critical thinking and enabling society to distinguish between truth and falsehood should be considered a central responsibility of universities.

University researchers and academic staff must actively contribute to these processes. This requires the development of more reliable communication strategies and stronger engagement with society. In particular, universities should create attractive and scientifically grounded content on social media platforms, both at the institutional and individual levels. Otherwise, the voice of the academic community risks being overshadowed by persistent and unregulated misinformation.

From an institutional perspective, universities must recognize the strategic importance of communication and ensure the dissemination of evidence-based information for the benefit of society. They should establish new communication channels to inform the public, including policymakers, about the fundamental role of higher education in national, regional, and local development. Failure to do so may result in a decline in public trust, erosion of academic freedom, and reduced societal support for universities.

Internationalization of Education and the Role of the English Language

In recent decades, the English language has become the dominant medium of communication in international academic environments. The increasing number of international and regional scientific events conducted in English has further strengthened its global status. Academic products—particularly journals and books—are predominantly published in English, and materials produced in countries such as the United States and the United Kingdom are widely distributed worldwide. These resources influence both students and academic staff globally while generating substantial revenues for publishing industries and expanding the reach of the English language. Universities are required to invest significant financial resources to access these materials, often at price levels determined by Western markets. In this context, collaboration with foreign partners has become a key driver of internationalization in higher education. Universities actively engage in joint research programs, dual-degree initiatives, and various forms of institutional partnerships, particularly with institutions from developed countries. According to reports by the International Association of Universities, among 782 surveyed institutions

worldwide, 64% participate in joint programs with foreign universities, while 80% are involved in dual-degree collaborations. These figures demonstrate the growing importance of international cooperation in higher education.

The increasing adoption of English Medium Instruction (EMI) represents a major trend in the internationalization of higher education. Universities are rapidly expanding English-language bachelor's and master's programs to attract international students and faculty, thereby enhancing their global competitiveness and research capacity.

The implementation of English-language education in universities is generally driven by four key factors:

1. Expansion of employment opportunities for graduates;
2. Enhancement of international collaboration;
3. Generation of additional financial resources;
4. Expansion of institutional activities at national and global levels.

These factors are closely interconnected and collectively contribute to the globalization of higher education systems.

Challenges and Risks of English Language Dominance

Despite its advantages, the growing dominance of English raises important concerns. Language is not merely a means of communication but also a carrier of culture, identity, and intellectual traditions. The widespread adoption of English in non-English-speaking countries may influence local cultures, ways of thinking, and educational practices.

Even countries such as France and Italy, which historically resisted the expansion of English in higher education to protect their cultural heritage, have recently begun to introduce more English-language programs. However, this shift has generated significant debate. Critics argue that such developments may undermine national identity and reduce the quality of education, while others view internationalization as primarily a revenue-generating strategy rather than an academic necessity.

The dominance of English also affects academic methodologies and publication practices. Many leading international journals are edited and reviewed by scholars from English-speaking countries, which creates structural advantages for native English-speaking researchers. Even highly cosmopolitan editorial boards often favor methodological approaches rooted in Anglo-American academic traditions.

This situation places non-native English-speaking scholars at a disadvantage. Language barriers, unfamiliarity with dominant academic conventions, and limited access to global academic networks may hinder their ability to publish in high-impact journals. These challenges are particularly pronounced in the social sciences and humanities, where cultural and contextual factors play a crucial role in research.

Furthermore, the pressure to publish in English-language journals often leads researchers to prioritize internationally relevant topics over locally significant issues. As a result, important national and regional research agendas may be neglected, weakening the development of local academic discourse.

Quality and Accessibility Issues in English-Medium Education

In practice, the rapid expansion of English-language programs has, in some cases, led to a decline in educational quality. This is often due to insufficient language proficiency among both faculty and students, as well as inadequate preparation for teaching in English. Additionally, limited access to high-quality academic materials in English can further complicate the learning process.

Implementing effective English-medium education requires not only linguistic competence but also pedagogical adaptation and institutional support. Without these elements, the benefits of internationalization may not be fully realized.

Global Inequalities and Linguistic Hegemony

The dominance of English has also contributed to global inequalities in higher education. In many developing countries, particularly in regions such as Africa, local languages are used primarily at primary and secondary levels, while higher education is conducted in English. This creates barriers to access, limits inclusivity, and reinforces social inequalities.

At the same time, English-speaking countries benefit from structural advantages in the global academic system. The majority of scientific journals are published in these countries, and editorial and peer-review processes are often concentrated within their academic networks. This reinforces the global hegemony of English and shapes the standards by which knowledge is evaluated.

Moreover, the widespread use of English has led to a decline in the use of other major academic languages, such as French, German, and Spanish. As a result, linguistic diversity in academia is diminishing, raising concerns about the homogenization of knowledge production.

The evolution of scientific publishing policies reflects broader transformations in the role of universities within the global knowledge economy. While publication activity remains a key indicator of academic performance, excessive emphasis on quantitative metrics risks undermining research quality, academic integrity, and intellectual diversity.

Future reforms should aim to:

- Balance quantitative and qualitative evaluation systems
- Promote meaningful and impactful research
- Strengthen the integration of teaching and research
- Encourage ethical and sustainable academic practices

Only through such transformations can universities maintain their role as centers of knowledge, innovation, and societal progress.

Empirical Analysis: University Transformation in the Context of the Knowledge Economy

1. Empirical Background and Data Description

To complement the theoretical analysis, this study incorporates empirical evidence based on international datasets and comparative indicators related to higher education systems. The empirical component relies on data from the OECD, World Bank, and global university rankings such as QS World University Rankings and Times Higher Education.

The analysis focuses on three key dimensions:

- Research productivity (publications and citations)
- Innovation capacity (university–industry collaboration, patents)
- Teaching transformation (digitalization, student engagement models)

Table 3. Key Indicators of University Transformation (Selected Countries)

Country	R&D Expenditure (% of GDP)	University–Industry Collaboration Index	Share of International Students (%)	Digital Learning Adoption (%)
USA	3.5	High	22	85
UK	2.9	High	25	80
Germany	3.1	High	18	78
China	2.4	Medium-High	10	90
Azerbaijan	0.2–0.3	Emerging	<5	65

Source: OECD (2022), World Bank (2020), QS/THE reports (adapted)

2. Key Empirical Findings

2.1. Research and Innovation Performance

Empirical evidence shows that countries with higher R&D investment demonstrate stronger university performance and global competitiveness. For example:

- Universities such as Massachusetts Institute of Technology and Stanford University lead in both publication output and innovation ecosystems.
- In China, Tsinghua University has rapidly improved its global ranking due to state-supported research funding and strong industry collaboration.

These cases confirm that financial investment + governance + talent concentration are critical determinants of university success.

2.2. Teaching Transformation and Digitalization

The empirical data indicate that digital learning adoption increased significantly during and after the COVID-19 pandemic:

- In OECD countries, more than 80% of universities implemented hybrid or online learning models (OECD, 2022).
- Platforms such as Coursera and edX expanded global access to higher education.

However, the data also reveal a paradox:

- While accessibility increased, student engagement and deep learning declined, particularly in humanities and social sciences.

2.3. Internationalization and Language Dynamics

Empirical indicators show a strong correlation between internationalization and university ranking performance:

- Universities with a higher share of international students tend to rank higher globally;
- English Medium Instruction (EMI) programs have increased by over 60% globally in the last decade.

However, in countries such as Azerbaijan:

- Internationalization remains limited,
- English-language publication barriers affect global academic visibility.

3. Model Framework: Transformation of Modern Universities

Based on the theoretical and empirical analysis, this study proposes an **integrated conceptual model of modern university** transformation.

Core Structure: "University Transformation Model"

INPUT FACTORS:

- Globalization
- Digitalization
- Knowledge economy
- Policy and governance reforms

⬇

CORE UNIVERSITY FUNCTIONS:

- Education (teaching & learning)
- Research (knowledge production)
- Innovation (commercialization & industry collaboration)

⬇

TRANSFORMATION MECHANISMS:

- Research–teaching integration
- Digital learning systems
- Internationalization (mobility, EMI)
- Academic publishing systems
- University–industry partnerships

⬇

OUTPUTS:

- Human capital development
- Scientific knowledge production
- Innovation and startups
- Societal impact

⬇

CHALLENGES / RISKS:

- "Publish or perish" pressure

- Decline in deep learning
- Language inequality (English dominance)
- Over-commercialization
- Metric-based evaluation bias

OUTCOMES:

- Global competitiveness
- Sustainable development
- Knowledge-based economy growth

4. Interpretation of the Model

The proposed model demonstrates that modern universities operate as complex adaptive systems rather than traditional institutions.

Key insights include:

- Universities are no longer isolated entities but part of global knowledge ecosystems
- Their success depends on the interaction between internal functions and external pressures
- The balance between education, research, and innovation determines institutional sustainability

Importantly, the model highlights that:

Universities must simultaneously respond to market demands while preserving academic integrity and social responsibility.

5. Empirical Contribution of the Study

Unlike purely theoretical studies, this research contributes by:

- Integrating empirical indicators with conceptual analysis
- Providing a comparative perspective across countries
- Proposing a new analytical framework for understanding university transformation

Findings

The analysis of contemporary higher education systems reveals a set of structural transformations and emerging challenges that are reshaping the mission, functions, and operational models of universities.

First, the study confirms that modern universities are transitioning from **knowledge-transmitting institutions to knowledge-generating and learning-centered organizations**. The traditional emphasis on teaching as a unidirectional process is being replaced by a model in which universities themselves must continuously learn, adapt, and innovate. Institutions that fail to internalize this learning-oriented paradigm are unlikely to effectively educate future generations. Universities today act as key producers of knowledge that directly influences legal, socio-economic, and political decision-making processes, thereby functioning as intellectual hubs or "think tanks" within society.

Second, scientific activity in modern universities is structured around three interdependent objectives: knowledge production through research, integration of research into teaching, and the preparation of highly qualified human capital aligned with labor market needs. These functions reinforce each other and collectively determine the societal relevance and competitiveness of universities in the global knowledge economy.

Third, the study identifies three dominant strategic pathways for the development of world-class universities:
(1) upgrading existing institutions with high potential;
(2) merging institutions to generate synergistic effects; and
(3) establishing new universities from scratch.
Each of these strategies demonstrates different levels of effectiveness depending on national contexts, resource availability, and governance structures.

Fourth, the findings emphasize the critical importance of integrating research into the teaching process. Effective teaching requires that academic staff actively engage students in their own research activities, ensuring transparency in the production of knowledge. The traditional reliance on standardized textbooks without incorporating original research reduces student engagement and weakens the development of analytical thinking. The most effective educational environments are those in

which students are exposed to the full research process, including problem identification, methodological design, and interpretation of results.

Fifth, the development of academic competencies and critical thinking skills emerges as a central priority. Academic knowledge remains universally relevant, particularly in conditions of uncertainty and complexity. However, the increasing reliance on digital tools and simplified information sources poses risks to deep learning and analytical reasoning, reinforcing the need for redesigned pedagogical approaches.

Sixth, the study highlights significant challenges in the evaluation of scientific activity. Current assessment systems rely heavily on quantitative indicators such as publication counts and citation metrics. While these indicators provide useful benchmarks, they fail to capture the full value and long-term impact of scientific contributions. The findings suggest that evaluation systems should incorporate qualitative expert assessments and public academic discussions to ensure a more comprehensive and accurate measurement of research performance.

Seventh, the "publish or perish" paradigm has led to the individualization of academic activity. Faculty members increasingly prioritize publication output and grant acquisition over collaborative academic responsibilities, such as mentoring young researchers and participating in institutional governance. This shift contributes to the fragmentation of academic communities and weakens collective intellectual development.

Eighth, the study reveals that early-career researchers are particularly affected by these pressures. Many adopt a publication-oriented mindset at the expense of genuine scientific inquiry, which may negatively influence research quality, ethical standards, and long-term academic development.

Ninth, the role of universities in societal communication is becoming increasingly important. Universities must develop new channels for engaging with the public and policymakers, ensuring the dissemination of scientifically grounded information. Failure to do so risks undermining public trust, academic freedom, and institutional legitimacy.

Finally, the analysis confirms the dominance of the English language in global academia, which simultaneously facilitates international collaboration and creates structural inequalities. While English serves as the primary medium of global scientific communication, its widespread adoption poses challenges for non-English-speaking scholars, influences research methodologies, and may contribute to the marginalization of local academic traditions and knowledge systems.

Conclusion

The findings of this study demonstrate that modern universities are undergoing a profound transformation, driven by technological, economic, and socio-cultural changes. The traditional model of the university—centered on knowledge transmission—is being replaced by a more complex and dynamic paradigm characterized by knowledge production, innovation, and societal engagement.

At the core of this transformation is the recognition that universities must become learning organizations capable of continuous adaptation. The integration of research and teaching, the development of critical thinking skills, and the alignment of educational outcomes with labor market needs are essential components of this new model.

However, the study also identifies several critical challenges. The increasing reliance on quantitative metrics in research evaluation, the dominance of the "publish or perish" culture, and the growing individualization of academic work risk undermining the quality and integrity of scientific activity. Addressing these issues requires a shift toward more balanced evaluation systems that combine quantitative indicators with qualitative expert assessments.

Furthermore, the expansion of internationalization and the dominance of the English language, while offering significant opportunities for global integration, also create new inequalities and cultural tensions. Universities must therefore adopt strategies that balance global competitiveness with the preservation of linguistic diversity and local intellectual traditions.

The transformation of universities into innovation-driven and market-oriented institutions also necessitates new competencies among academic staff, including the ability to manage research processes, engage with industry, and participate in knowledge commercialization. At the same time, universities must maintain their fundamental mission as independent centers of critical inquiry and societal development.

In conclusion, the future of universities depends on their ability to reconcile competing demands:

- quality versus quantity in research,
- global integration versus local relevance,
- innovation versus academic integrity, and
- market orientation versus social responsibility.

Achieving this balance will determine the extent to which universities can continue to serve as key drivers of knowledge, innovation, and sustainable development in the twenty-first century.

Declarations and Ethical Statements

Ethical Approval

This study does not involve human participants, animals, or any form of sensitive personal data. Therefore, ethical approval from an institutional review board was not required. The research is based entirely on secondary data sources, including published academic literature, institutional reports, and publicly available materials.

Data Availability Statement

The data supporting the findings of this study are derived from publicly available sources, including peer-reviewed journal articles, international reports (e.g., OECD, World Bank), and academic publications. All sources are properly cited in the reference list. No new datasets were generated or analyzed.

Conflict of Interest

The authors declare that they have no conflict of interest regarding the publication of this paper. There are no financial, personal, or professional relationships that could have influenced the research outcomes or interpretations.

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Author Contributions

- Zahid Farrukh Mammadov: Conceptualization, theoretical framework development, supervision, writing—original draft, critical revision.
- Shafa Aliyev: Literature review, data analysis, writing—review and editing, methodological development.

Both authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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Ethics Statement on Research Integrity

The authors confirm that this manuscript is an original work and has not been published previously, nor is it under consideration for publication elsewhere. All sources have been appropriately cited, and the study adheres to international standards of academic integrity, including the avoidance of plagiarism, data fabrication, and falsification.

AI Use Disclosure

The authors declare that artificial intelligence tools were used solely for language editing, structuring, and improving the clarity of the manuscript. All intellectual content, analysis, interpretations, and conclusions are the original work of the authors.

Compliance with International Standards

This study complies with internationally recognized guidelines and best practices in academic publishing, including:

- Principles of the Committee on Publication Ethics
- Recommendations of the International Committee of Medical Journal Editors (where applicable)
- Transparency and best practices in scholarly publishing

Data Transparency and Reproducibility

The study is based on transparent and verifiable sources. All references are accessible to the academic community, ensuring reproducibility and validation of the research findings.

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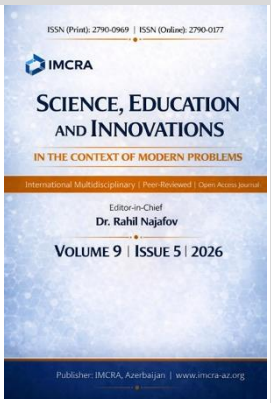
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RESEARCH ARTICLE

Legislative Exclusivity in the Regulation of Public Rights and Freedoms: A Constitutional and Analytical Assessment of the Balance Between Parliamentary Authority and Executive Intervention

Abdelaali Benkhouane
Dr.
University of Belkaïd Abou Bekr Tlemcen
Algeria
Email: benkhouaneabdelali@gmail.com

Habib Touab
Dr.
University of Belkaïd Abou Bekr Tlemcen
Algeria
E-mail: habibtouab22@gmail.com

Keywords Legislative exclusivity; constitutional law; public rights and freedoms; separation of powers; judicial review; parliamentary authority; executive power; public order.

Abstract

The protection of public rights and freedoms constitutes a fundamental pillar of modern constitutional states and serves as a key indicator of democratic governance and institutional legitimacy. Historically, the evolution of these rights has been closely associated with the gradual limitation of executive authority and the emergence of representative legislative institutions. Within this context, the principle of legislative exclusivity has developed as a central constitutional mechanism aimed at safeguarding individual freedoms by entrusting their regulation primarily to elected parliamentary bodies. This study provides a comprehensive analytical examination of legislative exclusivity as a legal and constitutional doctrine, focusing on its theoretical foundations, historical evolution, and practical implications in contemporary governance systems. The research investigates the extent to which legislative authority can effectively ensure the protection of rights and freedoms while maintaining the necessary balance with executive power, particularly in matters related to public order, national security, and administrative regulation. Adopting a doctrinal and analytical methodology, the study explores key constitutional frameworks, with particular reference to the Algerian constitutional system, while drawing comparative insights from other legal traditions, notably the French model. The analysis distinguishes between absolute and relative legislative exclusivity, highlighting the transformation of parliamentary sovereignty under modern constitutional arrangements that increasingly allow for limited executive intervention. Furthermore, the paper critically evaluates the constitutional limitations imposed on legislative authority, including adherence to constitutional norms, the prohibition of total suppression of freedoms, and the principle of proportionality in restricting rights. Special attention is given to the role of judicial review, particularly constitutional courts, as a safeguard against legislative overreach and a mechanism for ensuring the supremacy of constitutional principles. The findings of the study reveal that while legislative exclusivity remains a vital instrument for the protection

of rights and freedoms, its effectiveness is contingent upon the broader political and institutional environment, including the strength of democratic institutions, the independence of the judiciary, and the existence of robust constitutional oversight mechanisms. The study concludes that a balanced and dynamic interaction between legislative and executive authorities, supported by effective judicial control, is essential for achieving an optimal equilibrium between individual freedoms and the requirements of public order.

Citation

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Introduction:

It is well known that humankind has always strived, since time immemorial, to break free from all constraints that shackled its will. These constraints intensified with the advent of the state, which compelled individuals to live within a system defined by its ruling authority, currently known as the executive branch.

Looking back at the various historical periods that the state has undergone in previous eras, we find that the issue of rights and public freedoms was not a priority for the ruling authority, which was always inclined to curb and curtail freedom in every way possible. This was because its view was always that freedom was a threat to the ruler's throne and a cause of state instability. However, global developments, which have influenced the evolution of the concept of the state, have played a positive role in achieving a balance between power and freedom. This has been accomplished by placing matters of rights and freedoms exclusively under the jurisdiction of the legislative authority, which is elected by the people—a concept known as legislative exclusivity in the realm of rights and freedoms. This has become evident in the constitutions of most countries, which stipulate that matters of freedom, whether in their specific forms or in regulating their exercise, remain within the purview of the legislature, as is the case in various Algerian constitutions. This highlights that the constitutional framers have prioritized freedom over authority in cases of conflict.

However, this victory for freedom had to be balanced with the requirements of public order, which the executive branch is responsible for safeguarding. Therefore, the legislature's exclusive authority to regulate public rights and freedoms is subject to intervention by the executive branch to protect national security on the one hand, and freedom itself on the other. Consequently, the discussion here revolves around the limits imposed on the legislature in this regard.

The subject of this study is of paramount importance, as it is a matter of daily life, considered vital to individuals' daily existence. Consequently, it is one of the most fundamental issues for the state for two reasons. The first is the possibility of striking a balance between freedom and public order to preserve the state's security and continuity. The second is the state's external image, as democracy in a country is now measured by the extent to which it respects the freedoms of its citizens.

The central question addressed in this research paper is: To what extent is the legislature's exclusive authority over public rights and freedoms effective in providing the necessary protection for these rights and freedoms? And to what extent is this exclusive authority absolute or relative?

To answer this question within a structured methodological framework, we outline the following two-part plan:

The concept of legislative exclusivity (first section), and the scope of the legislature's authority in regulating public rights and freedoms (second section).

Literature Review

The regulation and protection of public rights and freedoms have long occupied a central position in constitutional theory and democratic governance. The emergence of the modern state necessitated a reconfiguration of power relations, particularly between the legislative and executive branches, to ensure that individual freedoms are not subordinated to arbitrary authority. Within this context, the principle of legislative exclusivity has evolved as a normative mechanism aimed at safeguarding rights by allocating primary regulatory competence to democratically elected legislative bodies.

Classical constitutional theory, particularly as articulated by Montesquieu, established the foundational doctrine of the separation of powers, emphasizing the necessity of distributing state authority among legislative, executive, and judicial branches to prevent tyranny. This framework positioned the legislature as the primary law-making authority, entrusted with expressing the general will of the people. Subsequent legal theorists, such as Ronald Dworkin, further reinforced the centrality of rights within constitutional systems, arguing that rights function as "trumps" against governmental overreach, thereby necessitating strong institutional guarantees.

The doctrine of legislative exclusivity gained particular prominence in continental legal systems, especially following the constitutional transformations associated with the French Revolution. Early conceptions emphasized absolute legislative sovereignty, whereby parliament held exclusive authority to regulate all matters, including rights and freedoms. However, this absolutist approach gradually evolved into a more nuanced understanding of "relative legislative exclusivity," reflecting the practical necessity of executive participation in regulatory processes (Vile, 1998).

Modern scholarship highlights that legislative exclusivity is neither absolute nor self-sufficient. Jürgen Habermas conceptualizes law as a product of communicative rationality, wherein legitimacy arises from democratic deliberation rather than institutional monopolization. From this perspective, the effectiveness of legislative authority depends on procedural fairness, inclusivity, and institutional balance. Similarly, Robert Alexy emphasizes the principle of proportionality as a critical standard for assessing limitations on rights, arguing that any restriction must be necessary, suitable, and balanced in relation to competing public interests.

In parallel, the expansion of executive functions in modern administrative states has challenged the traditional boundaries of legislative exclusivity. Scholars such as Stone Sweet (2000) and Ginsburg (2003) demonstrate that executive authorities increasingly participate in norm-making through delegated legislation, regulations, and administrative acts. This shift has necessitated the development of robust judicial oversight mechanisms to prevent abuse of power and ensure constitutional compliance.

Judicial review has thus emerged as a cornerstone of contemporary constitutional systems. The establishment of constitutional courts, particularly in European and post-colonial contexts, reflects an institutional response to the risks associated with both legislative and executive overreach. Hirschl (2004) argues that the global expansion of judicial power represents a "juristocratic" turn, wherein courts play a decisive role in safeguarding rights and maintaining constitutional equilibrium.

In the Algerian context, constitutional developments reflect a hybrid model that incorporates elements of both absolute and relative legislative exclusivity. While the constitution formally assigns the regulation of rights and freedoms to the legislature, it simultaneously allows for executive intervention under specific conditions, particularly in matters related to public order and national security. This duality underscores the importance of institutional balance and highlights the limitations of legislative exclusivity as a standalone mechanism.

Overall, the literature indicates that while legislative exclusivity remains a foundational principle in constitutional law, its effectiveness is contingent upon complementary mechanisms, including judicial review, executive accountability, and adherence to constitutional norms. The contemporary challenge lies not in preserving absolute exclusivity, but in

achieving a dynamic equilibrium that ensures both the protection of individual freedoms and the effective functioning of the state.

Conceptual Model Framework

3.1 Theoretical Framework

This study proposes a multi-dimensional governance model for analyzing legislative exclusivity in the protection of rights and freedoms. The model is grounded in three core constitutional principles:

- Separation of powers
- Rule of law
- Judicial oversight

3.2 Model Components

1. Legislative Authority (Independent Variable)
    - Enacts laws regulating rights and freedoms
    - Defines scope, limitations, and guarantees
    - Represents the will of the people
2. Executive Intervention (Moderating Variable)
    - Implements laws through regulations and administrative acts
    - May impose restrictions in the interest of public order and security
    - Risks overreach without legislative and judicial constraints
3. Judicial Review (Mediating Variable)
    - Ensures constitutional conformity of laws
    - Protects against legislative and executive abuse
    - Maintains balance between authority and freedom
4. Outcome Variable
    - Level of Protection of Rights and Freedoms

3.3 Conceptual Model Structure (Textual Form)

Legislative Authority → (shapes) Rights & Freedoms Regulation

Executive Authority → (moderates) Implementation & Restriction

Judicial Review → (controls) Constitutionality

Balanced Protection of Rights and Public Order

3.4 Hypotheses (Optional – for stronger publication level)

- **H1:** Strong legislative exclusivity positively influences the protection of rights and freedoms.
- **H2:** Excessive executive intervention negatively affects the level of rights protection.
- **H3:** Effective judicial review enhances the relationship between legislative authority and rights protection.

Findings and Discussion

The analysis reveals that the principle of legislative exclusivity plays a significant role in shaping the legal framework governing public rights and freedoms. However, its effectiveness is neither absolute nor uniform across different constitutional systems. Instead, it operates within a complex institutional environment characterized by the interaction of multiple state authorities.

First, the study confirms that legislative authority remains the primary mechanism for defining and regulating rights and freedoms. By virtue of its democratic legitimacy, the legislature is better positioned to reflect societal values and balance competing interests. This supports the classical assumption that parliamentary regulation provides a stronger safeguard against arbitrary power compared to executive control.

Second, the findings indicate that executive intervention is both necessary and problematic. On the one hand, the executive branch plays a crucial role in implementing laws and responding to dynamic societal needs, particularly in areas such as public security and emergency governance. On the other hand, excessive or unchecked executive power can undermine the very freedoms that legislative exclusivity seeks to protect. This duality highlights the importance of clearly defining the limits of executive authority within constitutional frameworks.

Third, the role of judicial review emerges as a decisive factor in ensuring the effectiveness of legislative exclusivity. Constitutional courts act as guardians of fundamental rights by reviewing the constitutionality of legislative and executive actions. The transition from constitutional councils to constitutional courts, as observed in Algeria, represents a significant advancement in strengthening institutional oversight and enhancing the protection of individual freedoms.

Furthermore, the study demonstrates that the balance between freedom and public order is inherently dynamic and context-dependent. In democratic systems with strong institutional checks and balances, legislative exclusivity tends to function effectively as a protective mechanism. In contrast, in systems where institutional independence is weak, legislative authority may be compromised, either by executive dominance or by internal political constraints.

Finally, the findings suggest that legislative exclusivity should not be understood as an isolated principle, but rather as part of an integrated constitutional system. Its success depends on the interaction between legislative, executive, and judicial institutions, as well as on broader political and societal factors, including transparency, accountability, and public participation.

The first requirement: The concept of legislative unilateralism.

The passage of time has played a significant role in shaping the concept of legislative unilateralism to its current form. This principle emerged as a reaction to the monopoly previously exercised by the ruling authority (the executive branch in its current sense) in enacting laws.

The ideas of some thinkers and philosophers advocating for the separation of powers have had a profound impact on empowering the legislative authority to exercise its functions of enacting laws regulating rights and freedoms with complete sovereignty, unchallenged in principle. In this section, we will examine the historical development of legislative unilateralism in the first subsection, and then define this principle in the second subsection.

Subsection One: The Historical Development of Legislative Unilateralism

The concepts stemming from the French Revolution of 1789 had a profound impact on the emergence of the principle of absolute legislative sovereignty of Parliament. Following this revolution, the principle of distributing powers between the executive and legislative branches was established. The latter became sovereign in drafting and approving laws, as it represented the people who freely elected it. Previously, sovereignty had been entirely vested in the executive branch, which was itself concentrated in the hands of the monarch. This change, which impacted the balance of power, particularly between the legislative and executive branches, enabled Parliament to exercise its authority in addressing various issues without any constraints.(Abdul Rahman Azzawi, p. 154.)

This helped to bring to the fore the principle of absolute legislative exclusivity, the specific definition of the law according to the formal standard, which came as follows: “The work that was voted on by the body competent to legislate, i.e., the parliament, in accordance with the legislative procedures in force, and is issued by the President of the Republic.”(Abdul Rahman Azzawi, pp. 154-155.)

The jurist Montesquieu defined it as a statement officially issued by the administration that addresses a public interest and comes in the form of general and abstract rules, devoid of any specification of their scope.(Rais Muhammad, Ramdani Fatima Zahra, A, p. 85.)

Parliament, as the representative of the legislative authority, exploited this definition of law to extend its sovereignty without any constraints, intervening to regulate any matter in any way it deemed appropriate, especially in the absence of constitutional oversight of the laws it issue , Judicial review of the constitutionality of laws remained absent from French

constitutions until the promulgation of the Constitution of October 4, 1958, known as the Constitution of the Fifth Republic, which introduced this review. However, this constitution is criticized for limiting itself to prior review of the constitutionality of laws without stipulating subsequent review exercised by the Constitutional Court through annulment proceedings, which constitutes a genuine guarantee of individual rights and freedoms.

Parliament's absolute control over the legislative process was evident in various French constitutions, particularly those issued between 1791 and 1924, which clearly enshrined the principle of the legislature's exclusive power. This went so far as to prohibit Parliament from delegating legislative authority to the executive branch. This situation did not last long, however, as subsequent constitutions allowed Parliament to empower the executive branch to address certain matters through legislation referred to it by Parliament. This remained the case until the 1946 Constitution, which restored full legislative sovereignty, prohibiting any role for the executive branch in this regard. Article 13 of this constitution states: "Parliament alone makes laws and cannot relinquish this right".

One of the factors that reinforced the idea of absolute legislative authority for parliament was the principle of separation of powers, a demand made by many jurists and thinkers, particularly the French philosopher Montesquieu. Montesquieu distinguished between the functions exercised by the three branches of government: legislative, executive, and judicial. The executive branch is responsible for implementing the laws issued by the legislative branch, utilizing regulations, decrees, and administrative contracts, in addition to providing the necessary material and human resources to ensure the proper functioning of the state. The judiciary, on the other hand, is responsible for reviewing and resolving disputes and overseeing the actions of the administration through litigation. Therefore, it is natural that the legislative branch should have exclusive powers, allowing it to perform its legislative function without involving any other party except in specific cases and through delegation.

Many constitutional law scholars have justified the legislature's exclusive authority over these tasks, citing an important reason: that this branch represents the people, who are considered the true owners of power. Most of the world's constitutions have stipulated this principle, including the Algerian constitution, which states in the second paragraph of Article 7: "Sovereignty belongs to the people alone."

Which he was unable to exercise himself, so he delegated the matter to members of parliament on his behalf.

This legislative exclusivity enjoyed by the legislative authority during this period did not remain absolute. The developments in France that led to the promulgation of a new constitution in 1958 had a profound impact on the principle of absolute legislative exclusivity. Under the provisions of this constitution, the legislative role of parliament was reduced, while the executive branch was granted the right to address certain issues and matters. This reduction was further exacerbated by the emergence of a distinction between law and legislation, which resulted in several provisions that favored the executive branch at the expense of the legislative branch. Among the most important of these were:(Rais Muhammad, Ramdani Fatima Zahra, p. 86.)

- The decline of parliamentary sovereignty in legislation, as it is no longer the sole expression of the public will.
- The explicit definition of the legislative authority's powers in the constitution, leading to the emergence of the principle of relative legislative exclusivity.
- The emergence of another authority competing with parliament's power in lawmaking: the executive branch. In addition to its powers to implement laws passed by parliament, the executive now possesses the authority to decide on matters not reserved for parliament.

The power of decision is defined as the recognition of the executive authority, and especially the president of the republic, to enter the legislative process through which it competes with the competent legislative authority. In this regard, Professor Raafat Fouda says that recognizing the executive authority as having a general decision-making power means recognizing it as having a legislative power through which it competes with the legislative authority.(Raafat Fouda, p. 07.)

Following the significant reduction in parliamentary powers introduced by the 1958 French Constitution, another concept of legislative exclusivity emerged, which facilitated a degree of executive branch participation and intervention in legislative tasks. This concept, termed "relative legislative exclusivity," is defined as the legislature's sufficiency to regulate a subject in general terms without delving into specifics, leaving that task to the executive branch.(Rice Muhammad, previous reference, p. 87.)

Also included within the relative legislative exclusivity are those topics and issues that were left unsaid by the constitutional founder.(The issues left unaddressed by the constitutional founder have been the subject of a difference of opinion among constitutional law scholars, between those who saw them as an inherent prerogative of Parliament in which the executive authority does not share, and those who saw the possibility of the latter participating in preparing and organizing these issues, considering that they fall within the relative legislative exclusivity of the legislator and not the absolute one. For more details, see Abd al-Rahman Azzawi, Rules for the distribution of jurisdiction between the legislative and executive authorities, previous reference, p. 227 and following.)

From this perspective, constitutions now reserve certain topics specific to the legislative authority, which the executive authority may not infringe upon, foremost among them being those topics related to rights and freedoms.(This is what the Algerian legislator has done through the text of Article 139, which includes 30 areas reserved for Parliament, foremost among them issues related to rights and freedoms.)

As for the matters in which the executive authority is permitted to intervene and regulate, we find that the constitutional framer always accompanies these matters with the phrase "the law specifies the conditions and methods of exercising this right" or the phrase "the law specifies the methods of exercising this right." (Examples of this in the Constitution include the constitutional amendment of 2020, Article 52 relating to freedom of expression, freedom of assembly and peaceful demonstration, and also Article 55 relating to the right to access information, documents and statistics and the right to privacy.)

Section Two: Defining Absolute Legislative Unilateralism.

While the principle of legislative unilateralism was initially a political concept, it has, thanks to the interpretations of constitutional scholars and courts, transformed into a constitutionally enshrined legal principle found in the constitutions of most countries worldwide.

Among the most important definitions offered in this regard by constitutional law scholars is that of Professor Eid Ahmed Al-Ghafloul, who defined absolute legislative unilateralism as: "The obligation of Parliament, and no other body, to enact comprehensive legislation on matters within its jurisdiction, without the executive branch having any significant role in this matter." (Eid Ahmed Al-Ghafloul, p. 79.)

Professor Ahmed Fathi Sorour offered a more comprehensive definition, stating: "The legislature alone has the authority to address matters within its jurisdiction. This principle means that the executive branch cannot, through regulations, address matters that fall exclusively under the legislature's purview. Furthermore, this principle means that the legislature cannot evade its responsibility to address these matters and provide guarantees for the exercise of rights and freedoms. However, this principle does not preclude the executive branch from regulating and implementing, through regulations, what the legislature has approved." (Ahmed Fathi Sorour, p. 400.)

The primary objective of the jurisprudence that establishes the principle of absolute legislative exclusivity is to prevent the executive branch from interfering in certain matters reserved for Parliament, as the representative of the people, foremost among them being the issue of rights and freedoms. On this basis, this principle can also be defined as a preventative measure that stands in the way of the executive branch should it wish to intervene to regulate a right or freedom without obtaining prior approval from the legislature.

Professor Ahmed Fathi Sorour further stated in this regard that: "When it comes to defining the limits within which rights and freedoms are exercised, there is only one authority in the state that is inherently competent to do so, and this authority is the legislative authority." (Ahmed Fathi Sorour, 2000, p. 401.)

This view is supported by the jurisprudence of the Supreme Constitutional Court of Egypt, which ruled on January 2, 1999, in Case No. 31, that the legislature's authority in regulating rights and freedoms is inherently absolute. That is, it must exercise sole legislative jurisdiction in this matter, considering that the essence of this authority lies in the legislature's choice between alternatives related to the subject of the legislative regulation. The legislature weighs these alternatives, favoring what it deems most suitable to the subject matter, most likely to achieve its intended objectives, and most likely to safeguard the most significant interests in its implementation. There is no restriction on the legislature exercising this authority unless the constitution has imposed specific controls regarding its exercise.

Given the importance of this principle in protecting rights and freedoms against the excesses of the executive branch, some legal scholars have argued that legislative intervention in regulating and protecting these rights and freedoms is obligatory. From this perspective, some constitutional law scholars have defined the principle of absolute legislative exclusivity as follows: "If rights and freedoms are exercised against the executive branch, then the legislative branch is entrusted, by virtue of the constitution, with guaranteeing these rights and freedoms. This is for the obvious reason that legislative power is exercised by representatives of the sovereign. Therefore, it is natural that legislation issued by this branch should exclusively guarantee rights and freedoms, which is known as the principle of legislative exclusivity." (Azawi Abdul Rahman, previous reference, pp. 183-184.)

The French Council of State followed the same approach, as evidenced in its decision of November 28, 1973, which affirmed the strong link between rights and freedoms and the absolute legislative prerogative of Parliament. This decision included the following phrase: "La Privation de la liberté relève de la loi" (The privacy of freedom is linked to the law). (It was mentioned by Ahmed Fathi Sorour in his book, Constitutional Protection of Rights and Freedoms, previous reference, p. 400.)

This implies that the curtailment or complete deprivation of freedom under specific circumstances can only be based on a law issued by the legislative authority.

The principle of absolute legislative exclusivity has evolved to encompass numerous subjects that were previously outside the legislature's purview, even though subjecting these subjects to legislative authority is relative and not to the same extent as addressing matters related to rights and freedoms, which do not permit any other body to participate in their regulation.

The second requirement: The scope of the legislature's authority in regulating public rights and freedoms.

In accordance with the principle of separation of powers, the legislative authority holds the original jurisdiction to enact and establish general legal rules that shape the state's public policy in various political, social, and economic fields.

Granting this authority to the legislative authority, to the exclusion of other authorities, stems from the principle of popular sovereignty, represented by Parliament in its two chambers, as previously mentioned. This is in accordance with Article 7 of the Constitution, which states: "The people are the source of all power." Similarly, Article 8, paragraph 1, states: "The people exercise their sovereignty through the constitutional institutions they choose."

Given that the issue of public rights and freedoms is directly related to the people, the Algerian constitutional framers entrusted the regulation of these rights and freedoms exclusively to the legislature. Article 139 of the Constitution, paragraph one, states: “Parliament shall legislate in the areas designated for it by the Constitution, as well as in the following areas:

The fundamental rights and duties of persons, in particular the system of public freedoms, the protection of individual freedoms and the duties of citizens.”

This could lead the constitutional body to deviate from its constitutional mandate regarding the regulation of rights and freedoms, making it imperative to establish limits that the legislature must adhere to.

These limits consist of: the legislature's adherence to the constitutional framework (Section 1); the prohibition of the total suppression of freedoms (Section 2); and the obligation to prioritize rights and freedoms when they conflict with the authority of the state (Section 3).

First Branch: The Legislator's Commitment to the Constitutional Framework:

The legislator bears the responsibility of enacting laws related to rights and freedoms within the framework of their constitutionally mandated duties. However, this responsibility is limited by the provisions of the constitution, such that the legislator cannot disregard these provisions and enact legislation that contradicts them.

In reality, the legislator's authority to enact laws regulating public rights and freedoms is sometimes restricted by the constitution, thus negating the legislator's discretion in drafting laws related to rights and freedoms. At other times, it is a discretionary power, where the constitution grants the legislator the authority to enact laws regulating a particular right or freedom without setting specific limits, except those related to public order.(This issue has created a difference of opinion among jurists, as we find that many of them objected to granting discretionary power to the legislator in setting laws regulating rights and freedoms, arguing that enabling the legislator to have this power contradicts the idea of guaranteeing freedom. Muhammad Asfour, Protecting the social order as a restriction on public freedoms, PhD thesis, Faculty of Law, Cairo University, 1961, p. 80.)

In most constitutions around the world, we find that they restrict the legislature's power to regulate public rights and freedoms for several reasons. This is what the Algerian constitutional framer did as well, restricting the legislature's power in this area for reasons related to maintaining public order and security, in addition to protecting national constants and the necessity of protecting other rights and freedoms enshrined in the constitution.(This was stated in the first paragraph of Article 34 of the 2020 constitutional amendment, which stipulated: “Rights, freedoms and guarantees may only be restricted by law, and for reasons related to maintaining public order and security, protecting national constants, as well as those necessary to protect other rights and freedoms enshrined in the constitution.)

Moreover, the constitutional founder unilaterally regulated certain rights and freedoms definitively, leaving no role for the legislature, as he did with freedom of the press in all its forms—written, audio, visual, and electronic—through Article 54 of the Constitution, which left no role for the legislature in regulating this type of freedom. (The constitutional founder did not limit himself to freedom of the press, but followed the same approach with several other rights and freedoms, including what is related to the sanctity of the home, which was stipulated in Article 48 of the 2020 constitutional amendment, and the freedom to choose a place of residence and movement, which was stipulated in Article 49 of the same constitutional amendment.)

These rights, which the constitutional framers codified in the articles of the constitution and did not leave to the ordinary legislator, were termed "absolute rights and freedoms" by the Egyptian jurist Abd al-Razzaq al-Sanhuri. He stated regarding them: "Besides the constitutional rights and freedoms that may be regulated by law, there are other freedoms and general rights that the constitution does not permit to be restricted, even by legislation passed by parliament. The constitution has not granted the legislator any authority over these; rather, they are freedoms and rights that may be called absolute rights and freedoms. The legislator may not intervene in defining them through legislation; otherwise, the legislation would be invalid due to its violation of the constitution."(Abdul Razzaq Al-Sanhuri, 1952, pp. 53-54.)

It is noteworthy that the Algerian constitutional framer, despite restricting the legislature's power in regulating certain rights and freedoms due to their paramount importance, allowed the legislature discretionary power regarding other rights and freedoms by granting Parliament independence in enacting laws it deems appropriate to regulate these rights and freedoms, whether through ordinary laws or organic laws. (Some constitutional law scholars argue that the constitutional framers' reliance on organic laws, beginning with the 1996 Constitution, restricts the legislature's discretionary power in

matters reserved for it, particularly rights and freedoms. They reason that this type of law requires special procedures, most importantly subjecting it to conformity review by the Constitutional Court, which diminishes the legislature's independence in its legislative function. For further details, see Mouloud Didane, p. 414.)

Here, the legislator undertakes to establish all the details pertaining to the right or freedom to be regulated, beginning with its definition and the legal basis upon which it rests. This includes specifying the administrative bodies responsible for granting licenses for its exercise, if any, and for overseeing its implementation, while also ensuring guarantees for its exercise within a framework that maintains public order stability. Thus, when exercising its discretionary power to regulate a freedom or right, the legislator leaves no room for the executive branch to interfere in its regulation except with regard to establishing the framework through which it is made public.(Abdul Rahman Azzawi, previous reference, p. 46.)

Among the freedoms that the constitutional framers left to the legislature to regulate through its discretionary power are the freedoms of assembly and peaceful demonstration, which are stipulated in the Algerian Constitution in Article 52, which states:

"Freedom of expression is guaranteed.

Freedom of assembly and freedom of peaceful demonstration are guaranteed and are exercised upon declaration.

The law shall determine the conditions and procedures for their exercise."

Thus, we find that the constitutional framers established the general framework for the freedoms of assembly and peaceful demonstration, leaving the specific details of the conditions and procedures for their exercise to the legislature, which undertook this task through Law 89-28 of December 31, 1989, as amended by Law 91-19 of December 2, 1991.

Granting the legislature discretionary power in regulating public rights and freedoms has led to a division in constitutional jurisprudence into two main schools of thought. The first, represented by the jurist Abd al-Razzaq al-Sanhuri, argues that granting the legislature this power does not enable it to diminish these rights and freedoms or deviate from the path prescribed by the constitution. Such deviation would constitute legislative transgression, occurring when the public right stipulated in the constitution becomes nullified by legislative intervention, failing to achieve its intended purpose.

Al-Sanhuri identifies the objective criterion for identifying legislative transgression. This criterion reveals whether a right or freedom established by the constitution and entrusted to the ordinary legislature for regulation has been diminished after such regulation, without considering the legislature's intent. This is based on the premise that the legislature, representing the people, is expected to be impartial, objective, and entirely free from personal biases in the performance of its duties, particularly in the realm of rights and freedoms, in order to achieve the public good and the common interest of society. To support his view, the jurist Sanhouri adds: "The legislator must use his legislative authority to achieve the public good and nothing else; otherwise, the legislation is invalid."

The second view holds that the legislator has the right to impose restrictions he deems appropriate when regulating rights and freedoms, because these are stipulated in the articles of the constitution in general terms and cannot be left unrestricted. Rather, restrictions must be imposed on them in consideration of the public order that must be maintained. According to proponents of this view, restricting any freedom or right can only be done by diminishing it. What the legislator must adhere to in this task is not to abolish the right or freedom he seeks to regulate. However, diminishing it by imposing restrictions is something that a legislator subject to public scrutiny may do. By examining the constitutional founder’s position on these theories, we find that he did not succumb to any of them, but rather chose to adopt all of them according to the freedom that was to be regulated. For example, we find that he adopted the first opinion regarding press freedoms and the right to the inviolability of the home, while he leaned towards the second opinion regarding other freedoms such as the freedom to establish political parties and the right to union work.

Second Branch: The Inadmissibility of Total Prohibition of Freedoms.

The legislature's possession of discretionary power in restricting public rights and freedoms does not mean that this power should remain absolute. Granting the legislature absolute discretion in matters of rights and freedoms could lead to the prohibition or abolition of certain freedoms under the guise of maintaining public order. Therefore, the legislature, in undertaking the task of regulating rights and freedoms, must observe the limits that ensure their preservation without resorting to total prohibition. As for partial prohibition, the constitution authorizes the legislature to do so in the interest of the public good.

The judiciary has permitted this type of prohibition if its motives aim to maintain public order within society.(Abdul Rahman Azzawi, previous reference, p. 67.)

Examples of this type of prohibition include banning large vehicles from near hospitals to ensure patient comfort, restricting movement in certain areas to protect public safety and security, and prohibiting the disposal of household waste at specific times to safeguard public health and the aesthetic appeal of cities.

However, while respecting the constitutional provisions defining its jurisdiction, the legislature must adhere to other conditions that prevent it from completely restricting freedoms. Firstly, it must support and guarantee freedom, not curtail it. This can only be achieved if legislation issued by the legislative authority mandates respect for freedom by the executive authority, which constantly seeks to limit freedom to maintain public order. The legislature can only succeed in this endeavor if its legal texts supporting rights and freedoms are free of loopholes and ambiguities that regulatory authorities could exploit to their advantage at the expense of individual freedoms and rights.(Adel Al-Saeed Muhammad Abu Al-Khair, p. 340.)

The second condition is that the legislator must include in his legislation relating to public freedoms guarantees that ensure their exercise and give them a character of legitimacy that grants individuals the right to resort to the judiciary if they are prevented from exercising their right to freedom.

The legislator's fulfillment of these conditions makes the administrative regulatory authority bound by the guarantees that ensure freedom, whether these guarantees were established by the constitutional founder or by the legislator in the laws he enacted to regulate freedom within the framework of the principle of balance between individual freedom and the public order of the state.(Public order has always played an important role in restricting freedom, to the point that public rights and freedoms have become subject to the mercy of public order. This is not limited to exceptional cases only, but even in normal cases. In the face of this situation, which always gives the advantage to public order at the expense of freedom, the principle of prioritizing freedom must be activated, especially if there is a conflict between its enactment and public order.)

Within this framework, regulatory authorities, when issuing decisions aimed at maintaining public order, must limit themselves to interpreting the legal texts regulating freedom issued by the legislator and refrain from exercising discretionary power in regulating any freedom, given that they do not possess any discretionary authority in this regard.(Raghib Jibril Khamis Raghib Sakran, p. 335.)

Legal scholars agree that, regardless of the extent of administrative discretion, the objective remains outside the scope of this discretionary power, which is always limited and subject to the oversight of the administrative judiciary.(Mustafa Abu Zaid Fahmy, p. 843.)

It is worth noting that the prohibition against the total suppression of freedom is no longer limited to domestic legal texts, whether constitutional or ordinary, but extends to international legal texts stipulated in international treaties and conventions, including the Declaration of the Rights of Man and of the Citizen. Articles 1 and 2 of this Declaration state that all people are born free and remain equal in rights, and that the aim of the political community is to safeguard these inherent and inalienable natural rights.

This Declaration grants the legislature the authority to set limits on rights and freedoms through Article 4, which states: "No limits may be imposed on freedoms except by law." However, despite this grant and recognition of this authority to the legislature, we maintain that the intention here is to regulate freedom, not to deprive it of it. This is for the simple

reason that the fundamental principle is that a person is free and is only restricted by compelling necessities. Many jurists have affirmed this, emphasizing that just as an absolute ban on freedom cannot be imposed, so too, absolute freedom does not exist; otherwise, we would be in a state of chaos where freedom would cease to exist. Therefore, the legislature must intervene not to suppress freedom, but to regulate it.(Muhammad Asfour, previous reference, p. 28.)

The Algerian constitutional founder followed the same direction, as the text that came in Article 139 of the 2020 constitutional amendment, which authorized the parliament to legislate in the field of people's rights and fundamental freedoms, does not mean that this legislative institution has this power without restrictions, but rather this power remains limited by what is required to balance the freedoms of individuals and the public interest of society, which requires maintaining public order.

Third Branch: Prioritizing Freedom When It Conflicts with Public Order.

The principle of prioritizing freedom means that legal texts, whether those stipulated in the constitution or future legislative texts issued by the parliamentary authority, should be interpreted in favor of freedom as much as possible. This is achieved by avoiding restricting freedom with limitations that burden it and restrict its exercise, except to the extent necessary to balance the interests of individuals, who always strive for freedom from all constraints, with the public interest of society, which is represented in maintaining the state's public order. (Abdul Rahman Azzawi, previous reference, p. 101.)

Interpretation is not limited to legislative texts, whether fundamental or ordinary, but extends to regulations and bylaws issued by the executive authority. While these bylaws often serve to interpret legal texts issued by the legislature, particularly those related to public rights and freedoms, the principle of prioritizing freedom necessitates imposing limitations on the legislative authority, which is constitutionally mandated to regulate public rights and freedoms, as stipulated in Article 139 of the 2020 constitutional amendment. This is to prevent legislation from excessively restricting freedom to the point of making its exercise difficult for individuals.

Some legal scholars have established two conditions for laws issued by the legislative authority regulating rights and freedoms. The first condition pertains to the legislation itself, which must support freedom, not restrict it. The second condition requires that this legislation include a set of safeguards that act as a protective shield for rights and freedoms against any potential abuse of power by the authorities. (Munib Muhammad Rabi', pp. 282-283.)

Fourth Branch: Judicial Review of the Constitutionality of Laws.

The constitution, as the supreme law of the land, empowers the legislative authority to regulate the exercise of individual rights and freedoms through the laws it enacts. However, granting the legislature this power without any oversight can lead to violations of constitutional principles if the legislature oversteps its authority, thus becoming tyrannical in regulating rights and freedoms. In this regard, Professor Ali El-Sayed El-Baz states: "While tyranny can arise from any branch of government, it becomes a devastating threat to freedom when it originates from a tyrannical legislature. In such cases, tyranny will masquerade as freedom, and freedom will be violated in the name of the law. Furthermore, the transgressions of the legislative authority are more stable, persistent, and dangerous than those of the executive authority, given that the former are enacted in the form of laws characterized by their generality and abstract nature." (Ibn Tayfur Nasr al-Din, previous reference, p. 73)

In order to keep legislative power within its defined scope and prevent it from exceeding it, the idea of judicial review of the constitutionality of laws was introduced. This idea arose from the hierarchy of legal rules in the state, with higher rules prevailing over lower ones, which inevitably leads to ensuring the supremacy of constitutional rules. (In order to keep legislative power within its defined scope and prevent it from exceeding it, the idea of judicial review of the constitutionality of laws was introduced. This idea arose from the hierarchy of legal rules in the state, with higher rules prevailing over lower ones, which inevitably leads to ensuring the supremacy of constitutional rules.)

This prevents legislative instability by ensuring the legislature respects rights and freedoms.

The concept of judicial review of the constitutionality of laws emerged in the constitutions of European countries, such as the 1958 French Constitution, which entrusted this task to a Constitutional Council. This council was largely political in nature due to its composition.

World Experience and Comparative Analysis

The principle of legislative exclusivity in regulating public rights and freedoms has been shaped by diverse constitutional traditions across the world. While its theoretical foundation remains rooted in the doctrine of separation of powers, its practical application varies significantly depending on the legal system, political structure, and institutional maturity of each country. A comparative analysis of selected jurisdictions—particularly France, the United States, Germany, and Algeria—reveals both convergences and divergences in how legislative authority interacts with executive power and judicial oversight in safeguarding fundamental rights.

The French Model: From Absolute to Relative Legislative Exclusivity

The French constitutional system represents one of the earliest and most influential models of legislative exclusivity. Following the French Revolution of 1789, the legislature was regarded as the sole expression of the general will, reflecting the ideas of Montesquieu and revolutionary constitutionalism. This led to the establishment of absolute legislative sovereignty, whereby Parliament exercised exclusive authority over lawmaking, including the regulation of rights and freedoms.

However, the adoption of the 1958 Constitution of the Fifth Republic marked a significant transformation. Legislative authority became constitutionally limited, with specific domains reserved for Parliament and others assigned to the executive branch. This shift introduced the concept of relative legislative exclusivity, allowing the executive to participate in norm-making through regulations and delegated legislation.

Additionally, the establishment of the Constitutional Council strengthened judicial oversight, although initially limited to ex ante review. Over time, reforms expanded its role, enabling individuals to challenge laws through constitutional review procedures. The French model thus evolved into a balanced system, where legislative authority remains central but operates within a framework of executive participation and judicial control.

The United States: Judicial Supremacy and Constitutional Rights

In contrast to the French model, the United States adopts a system where legislative authority is constrained by a strong tradition of judicial supremacy. The Constitution establishes a clear separation of powers, but the ultimate authority in interpreting and protecting rights lies with the judiciary, particularly the Supreme Court of the United States.

Through landmark decisions such as *Marbury v. Madison* (1803), judicial review became a foundational mechanism for ensuring constitutional supremacy. Unlike systems that emphasize legislative exclusivity, the U.S. model places constitutional rights above legislative authority, allowing courts to invalidate laws that infringe upon fundamental freedoms.

Moreover, the presence of a comprehensive Bill of Rights limits legislative discretion, ensuring that freedoms cannot be easily restricted by ordinary legislation. While Congress plays a significant role in defining the scope of rights through statutory law, its authority is consistently subject to judicial scrutiny. This results in a system where legislative exclusivity is secondary to constitutional and judicial guarantees.

The German Model: Constitutional Supremacy and Proportionality

Germany provides a distinctive model characterized by strong constitutional safeguards and a sophisticated system of judicial review. The Federal Constitutional Court of Germany plays a central role in protecting fundamental rights, which are enshrined in the Basic Law (Grundgesetz).

Unlike purely legislative systems, the German model emphasizes the principle of constitutional supremacy, where all legislative acts must conform to constitutional standards. A key feature of this system is the doctrine of proportionality, extensively developed by Robert Alexy. According to this principle, any restriction on rights must meet criteria of necessity, suitability, and proportional balance.

In this framework, the legislature retains the authority to regulate rights and freedoms but operates under strict constitutional constraints. Judicial review ensures that legislative and executive actions do not exceed permissible limits. Consequently, the German system represents a highly balanced model, integrating legislative authority with strong judicial oversight and constitutional protection.

The Algerian Model: Hybrid Constitutional Approach

The Algerian constitutional system reflects a hybrid model that incorporates elements of both legislative exclusivity and executive participation. As indicated in the constitutional provisions, particularly Article 139, the legislature is granted primary authority to regulate rights and freedoms. This aligns with the classical notion of legislative exclusivity as a mechanism for democratic representation.

However, in practice, the executive branch retains significant powers, particularly in areas related to public order, security, and emergency governance. This reflects the broader trend observed in many developing legal systems, where executive authority plays an active role in law implementation and regulation.

The introduction of the Constitutional Court in the 2020 constitutional reform represents an important step toward strengthening judicial oversight. This development enhances the protection of rights by providing mechanisms for both prior and subsequent constitutional review. Nevertheless, the effectiveness of this system remains dependent on the independence of institutions and the broader political context.

Comparative Evaluation

A comparative assessment of these models highlights several key observations:

- Legislative exclusivity is not absolute in any modern system; it is consistently balanced by executive functions and judicial review.
- Systems such as the United States and Germany prioritize constitutional supremacy and judicial oversight, limiting legislative discretion more strictly.
- The French and Algerian models illustrate a transition from absolute to relative legislative exclusivity, reflecting the realities of modern governance.
- The effectiveness of rights protection depends not only on legal frameworks but also on institutional strength, democratic culture, and rule of law principles.

Ultimately, the global experience demonstrates that the protection of public rights and freedoms cannot rely solely on legislative authority. Instead, it requires a multi-institutional approach, where legislative, executive, and judicial powers operate in a coordinated and balanced manner.

In Algeria, the constitutional framers established a system of judicial review of the constitutionality of laws with the first constitution of the Algerian Republic in 1963. Despite the constitutional framers' inclusion of this system in the 1963 Constitution, it was not implemented due to the constitution's short lifespan, as it was suspended shortly after its promulgation, lasting only 23 days. Article 64 stipulated: "The Constitutional Council shall rule on the constitutionality of laws and legislative decrees at the request of the President of the Republic or the President of the National Assembly." While this type of oversight of the legislative branch's work regarding the regulation of rights and freedoms was expected to be enshrined in the 1976 Constitution, the constitutional framers did not include it in its provisions. This left the situation unchanged from the 1963 Constitution until the promulgation of the 1989 Constitution, which stipulated the existence of a Constitutional Council tasked with ensuring respect for laws. Article 153 states: "A Constitutional Council shall be established, tasked with ensuring respect for the Constitution." It is clear that the constitutional framers followed the model of their French counterparts in establishing the Constitutional Council. However, the difference between the two lies in the composition of the two councils. While the French Constitutional Council, as previously mentioned, is purely political, this is not the case for the Algerian council due to its mixed composition, which includes both political and judicial members, although the political members constitute the majority. Similarly, the 1996 Constitution also

established a system of judicial review of the constitutionality of laws, exercised by a Constitutional Council entrusted with ensuring respect for the provisions of the Constitution.

According to the previous form of this oversight, which is mandatory for organic laws and the internal regulations of each chamber of Parliament, and optional for other ordinary laws, regulations, and texts, the era of immune legal texts issued by the legislature, as was the case before the 1989 Constitution, has ended. Thus, any law issued by the legislative authority, whether resulting from a bill submitted by the government or a proposal from members of the National People's Assembly, is subject to annulment if it is found to be contrary to the provisions of the Constitution, by a decision of the Constitutional Council. Article 169 of the 1996 Constitution stipulates: "If the Constitutional Council deems a legislative or regulatory text unconstitutional, that text shall cease to have effect as of the date of the Council's decision." This decision is considered final and has absolute authority, not subject to appeal in any way, according to Article 49 of the regulations governing the work of the Constitutional Council, dated June 28, 2000, which states: "The opinions and decisions of the Constitutional Council are binding on all public, judicial, and administrative authorities and are not subject to any appeal." (The specific system for the rules of operation of the Constitutional Council, dated June 28, 2000, Official Gazette of the People's Democratic Republic of Algeria, No. 48, issued on: August 6, 2000.)

Starting in 2016, and on the occasion of the constitutional amendment of that year, the oversight of the constitutionality of laws in Algeria witnessed a remarkable development that positively impacted public rights and freedoms by empowering members of parliament with a parliamentary notification mechanism, while litigants were given the right to challenge the constitutionality of the laws intended to be applied to them. (Articles 187-188 of the 2016 constitutional amendment have already been referred to.)

In an effort to strengthen the process of reviewing the constitutionality of laws, the constitutional framers gave this review a judicial character. This occurred with the recent constitutional amendment of 2020, which transitioned from the Constitutional Council system to the Constitutional Court system. The establishment of the Constitutional Court was stipulated in Article 185 of the 2020 constitutional amendment, which stated: "The Constitutional Court is an independent institution tasked with ensuring respect for the Constitution." Its composition differed somewhat from that of the Constitutional Council, both in terms of the number of members and their qualifications. It comprised twelve members: four appointed by the President of the Republic, including the President of the Court; one elected by the Supreme Court from among its members; one elected by the Council of State from among its members; and six elected by universal suffrage from among professors of constitutional law. The constitutional framers retained the system of prior and subsequent review in this amendment, while obligating the Constitutional Court to issue a ruling regarding the review, unlike the 1996 constitution, which stipulated an opinion rather than a ruling (Article 190 of the aforementioned 2020 constitutional amendment).

In conclusion, we say that imposing oversight on the work of the legislature with regard to the regulation of rights and freedoms is a necessity, and the Algerian constitutional framer has kept pace with the development of this oversight by diversifying the sources of notification when he stipulated the possibility of notification to the Constitutional Court by members of Parliament, because leaving notification limited to the officials of the authority, headed by the President of the Republic, may not yield the desired results, especially if we know that most of the laws regulating public freedoms come through projects from the executive authority represented by the government appointed by the President of the Republic, and therefore it is unreasonable for the officials of the latter to submit a notification about a law submitted by someone affiliated with them, unlike the parliamentary notification which comes from the representatives of the people and always seeks to remove the legal obstacles that restrict individuals' exercise of their freedoms and their enjoyment of their constitutionally enshrined rights.

Conclusion:

In conclusion, this study yields the following results and recommendations:

First, the results:

- The principle of legislative exclusivity, as a mechanism, was necessitated by the urgent need to provide a degree of protection for public rights and freedoms, following the restrictions and deprivations imposed upon them, particularly under monarchical rule, which did not recognize freedom on the grounds that the ruler was considered a representative of God and his orders could not be questioned or refused.
- The principle of legislative exclusivity has achieved several positive outcomes for freedom, given that the legislator is a representative of the people and will therefore be more inclined towards the popular will than anything else.
- Granting the legislature the authority to regulate public rights and freedoms does not mean excluding the executive branch from regulating these rights and freedoms, nor does it mean allowing individuals to do as they please. Rather, it means that the legislature establishes the general framework for freedom, while the executive branch undertakes the task of implementing these laws in accordance with the public interest of the state, which guarantees the integrity of public order. The political system plays a significant role in the success or failure of the principle of legislative autonomy. The more democratic the system, the greater the success, and the opposite is true for authoritarian regimes.

Secondly: Recommendations: Among the most important recommendations stemming from this study are: - The necessity of creating a balance between the executive and legislative branches in the field of rights and freedoms, such that the work of one is incomplete without the other, thus achieving the desired balance between public order and freedom.

- The constitutional framers should strive harder to define the scope of executive intervention in the field of rights and freedoms, ensuring that such intervention remains an exception and does not become the general rule, as is the case with intervention in parliamentary affairs.
- Restricting the mechanisms by which the president interferes in legislative work through decrees concerning individual rights, limiting such intervention to matters of urgent necessity.

Ethical Considerations

This study adheres to internationally recognized ethical standards in academic research and publication. The research is based exclusively on doctrinal and analytical examination of legal texts, constitutional provisions, and scholarly literature. No human participants, personal data, or sensitive information were involved in the research process.

All sources have been properly acknowledged and cited in accordance with academic integrity principles. The authors confirm that the manuscript does not involve plagiarism, fabrication, falsification, or misrepresentation of data. The study complies with general ethical guidelines consistent with international standards such as those promoted by the Committee on Publication Ethics.

Conflict of Interest Statement

The authors declare that there are no conflicts of interest regarding the publication of this article. The research was conducted independently, and no financial, institutional, or personal relationships have influenced the study's design, analysis, or interpretation.

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- Conceptualization and research design: All authors
- Literature review and theoretical framework: All authors
- Analysis and interpretation: All authors
- Writing – original draft preparation: All authors
- Writing – review and editing: All authors

All authors have read and approved the final version of the manuscript.

Data Availability Statement

The data supporting the findings of this study are derived from publicly available legal documents, constitutional texts, and academic literature. No new datasets were generated or analyzed during the current study. Therefore, data sharing is not applicable to this article.

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Plagiarism and Originality Statement

The authors confirm that this manuscript is original, has not been published previously, and is not under consideration for publication elsewhere. All sources have been appropriately cited, and the manuscript complies with standard plagiarism thresholds.

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The authors declare that no generative artificial intelligence tools were used in the development of the research content, analysis, or conclusions. Any language editing tools used were applied solely to improve clarity and readability and did not influence the intellectual content of the work.

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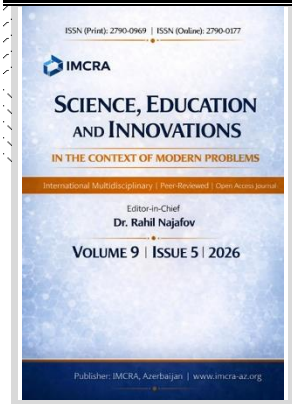
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RESEARCH ARTICLE

Cyber Warfare and Its Environmental Consequences: A Critical Legal Analysis of International Responsibility, Attribution Challenges, and the Protection of Environmental Rights in Cyberspace

Brahmi Hanane
Dr.
University Mohamed Khider Biskra
Algeria
Email: h.brahmi@univ-biskra.dz ; https://orcid.org/0009-0003-8063-9284

Noureddine Khouidem
Dr.
University mohamed Khider Biskra
Algeria
E-mail: noureddine.khouidem@univ-biskra.dz
https://orcid.org/0009-0001-0784-0833

Keywords
Cyber warfare; environmental damage; international law; attribution; state responsibility; international criminal law; cyberspace; environmental protection; critical infrastructure; cyber security governance.

Abstract
The transformation of contemporary warfare through rapid technological advancement has led to the emergence of cyber warfare as a dominant domain of international conflict. Unlike traditional armed conflicts, cyber operations are conducted within an intangible digital environment; however, their consequences extend beyond cyberspace, often resulting in significant and sometimes irreversible damage to the natural environment. This evolving form of warfare presents complex legal and practical challenges, particularly in relation to the identification of perpetrators, attribution of responsibility, and the application of existing international legal frameworks. This study critically examines the environmental implications of cyber warfare within the context of international law, with a particular focus on the adequacy of current legal norms in addressing environmental harm caused by cyber operations. It explores the conceptual foundations of cyber warfare, distinguishing it from conventional and network-based conflicts, and analyzes the mechanisms through which cyberattacks targeting critical infrastructure—such as energy systems, water resources, and industrial facilities—can generate severe environmental consequences, including pollution, ecosystem degradation, and long-term ecological disruption. The research further evaluates the principles governing international responsibility, both civil and criminal, for environmental damage resulting from cyber warfare. Particular attention is given to the challenges of attribution in cyberspace, where anonymity, technological complexity, and the involvement of non-state actors hinder the effective enforcement of legal accountability. The study also examines the relevance of existing international legal instruments, including the Rome Statute of the International Criminal Court and the Tallinn Manual 2.0, highlighting their limitations in addressing the unique characteristics of cyber-induced environmental harm. The findings reveal that while current international legal frameworks provide a general foundation for regulating cyber warfare, they remain insufficient to fully address its environmental consequences. The study concludes that there is an urgent need for the development of more specialized legal norms, enhanced international cooperation, and the integration of environmental protection principles into cyber governance strategies. Strengthening attribution mechanisms, expanding the scope of international criminal law to include emerging environmental cybercrimes, and promoting preventive cybersecurity measures are identified as key priorities for ensuring effective protection of environmental rights in the digital age.

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Introduction:

The rapid advancement of digital technologies has fundamentally transformed the nature of contemporary conflict, giving rise to cyber warfare as a distinct and increasingly dominant domain of international security. Unlike traditional forms of armed conflict, which are characterized by physical force and clearly defined battlefields, cyber warfare operates within a borderless and intangible digital environment. Despite its non-physical nature, cyber warfare possesses the capacity to generate significant real-world consequences, including large-scale disruption of critical infrastructure, economic instability, and, increasingly, severe environmental damage.

The growing reliance of states on information and communication technologies has expanded the vulnerability of essential systems, including energy grids, water supply networks, transportation systems, and industrial control mechanisms. Cyberattacks targeting these infrastructures can lead to cascading failures with direct and indirect environmental consequences, such as toxic leaks, pollution, ecosystem degradation, and long-term ecological imbalance. In this context, environmental harm resulting from cyber operations represents a critical yet underexplored dimension of modern warfare.

Moreover, cyber warfare introduces unprecedented legal and conceptual challenges within the framework of international law. One of the most significant difficulties lies in the problem of attribution, as cyber operations are often conducted anonymously or through complex networks that obscure the identity of perpetrators. This ambiguity complicates the application of established principles of international responsibility, both civil and criminal, and undermines the effectiveness of existing accountability mechanisms. The involvement of non-state actors further exacerbates this challenge, blurring the traditional boundaries of state-centric legal frameworks.

In parallel, the recognition of environmental rights as an integral component of contemporary human rights discourse has elevated the importance of addressing environmental harm in all forms of conflict, including those occurring in cyberspace. The emergence of so-called "fifth-generation rights," encompassing digital and environmental dimensions, underscores the necessity of developing comprehensive legal protections that reflect the realities of the digital age. However, current international legal instruments were largely designed to regulate conventional forms of warfare and may be ill-equipped to address the unique characteristics and consequences of cyber-induced environmental damage.

Against this background, the present study seeks to critically examine the impact of cyber warfare on the environment through the lens of international law. It aims to analyze the extent to which existing legal frameworks are capable of addressing environmental harm resulting from cyber operations, with particular emphasis on issues of attribution, state responsibility, and international accountability. Furthermore, the study explores the need for the development of specialized legal norms and enhanced international cooperation to effectively regulate cyber warfare and ensure the protection of environmental rights.

By situating cyber warfare within the broader context of environmental protection and international legal responsibility, this research contributes to the growing body of scholarship addressing the intersection of technology, security, and sustainability. It ultimately argues that the protection of the environment in the digital era requires a rethinking of traditional legal approaches and the adoption of integrated, forward-looking regulatory strategies capable of responding to the complexities of cyber conflict.

Literature Review

The rapid evolution of cyber technologies has fundamentally transformed the nature of modern conflict, giving rise to cyber warfare as a distinct domain of international security. Unlike traditional warfare, cyber warfare operates within an intangible digital environment, yet its consequences can manifest in tangible and often severe forms, including environmental damage. As states and non-state actors increasingly rely on cyber capabilities, the intersection between cyber operations and environmental protection has emerged as a critical area of scholarly and legal inquiry.

Early studies on cyber warfare, such as those by John Arquilla and David Ronfeldt, conceptualized cyber conflict as a new form of warfare driven by information dominance and network disruption. Subsequent research expanded this understanding by examining the strategic, legal, and ethical implications of cyber operations. Scholars have emphasized that cyber warfare differs from conventional warfare in its lack of clear boundaries, difficulties of attribution, and the involvement of non-state actors (Schmitt, 2014; Robinson et al., 2015).

From a legal perspective, the applicability of international law to cyber warfare has been widely debated. The Tallinn Manual 2.0 represents one of the most comprehensive efforts to interpret how existing rules of international humanitarian law apply

to cyber operations. Although not legally binding, it provides authoritative guidance on issues such as the use of force, state responsibility, and the protection of civilian infrastructure. Scholars such as Michael N. Schmitt argue that existing legal frameworks are generally applicable to cyberspace, though significant gaps remain, particularly in relation to environmental harm and attribution.

Environmental protection within the context of armed conflict has traditionally been governed by principles of international humanitarian law, including the prohibition of widespread, long-term, and severe damage to the natural environment. However, the emergence of cyber warfare has complicated the application of these principles. Cyber operations targeting critical infrastructure—such as energy grids, water systems, and industrial facilities—can result in indirect but substantial environmental damage, raising questions about liability and accountability.

The issue of state responsibility in cyberspace is particularly complex due to the inherent difficulties in attributing cyberattacks to specific actors. According to the International Law Commission Draft Articles on State Responsibility (2001), a state is responsible for internationally wrongful acts attributable to it. However, the technical anonymity of cyberspace challenges the practical application of these rules. Scholars such as Thomas Rid and others have highlighted that attribution remains one of the most significant obstacles to enforcing international legal norms in cyber conflicts.

Recent literature has also begun to explore the environmental implications of cyber warfare in greater depth. Cyberattacks on industrial control systems can lead to chemical leaks, energy disruptions, and failures of environmental monitoring systems. These impacts extend beyond immediate physical damage to include long-term ecological degradation and risks to human health. As a result, there is a growing consensus among scholars that existing international legal frameworks are insufficient to address the unique challenges posed by cyber-induced environmental harm.

Overall, the literature suggests that while significant progress has been made in understanding cyber warfare and its legal implications, there remains a critical gap in integrating environmental considerations into cyber conflict regulation. This study contributes to this emerging field by examining the intersection of cyber warfare, environmental damage, and international responsibility within a unified analytical framework.

Conceptual Model Framework

Theoretical Foundation

The proposed framework is grounded in three core theoretical principles:

- International Responsibility Theory
- Cybersecurity Governance
- Environmental Protection Law

These principles collectively explain how cyber operations translate into environmental consequences and legal accountability.

Model Components

1. Cyber Warfare Activities (Independent Variable)

- Cyberattacks on infrastructure
- Malware and system disruption
- Digital sabotage of environmental systems

2. Mediating Mechanisms

- Infrastructure Disruption (energy, water, transport systems)
- System Failure (industrial control systems, monitoring systems)
- Data Manipulation (loss of environmental data, monitoring gaps)

3. Moderating Factors

- Attribution Capability (technical ability to identify attacker)
- Legal Framework Strength (international law, national laws)
- State Capacity (cyber defense and environmental protection systems)

4. Dependent Variable

- Environmental Damage
    - Pollution
    - Ecosystem destruction
    - Resource degradation
    - Long-term environmental risks

5. Outcome Variable

- International Responsibility
    - Civil liability (compensation)
    - Criminal liability (ICC jurisdiction)
    - State accountability

Model Structure (Simplified)

Cyber Warfare → Infrastructure Disruption → Environmental Damage
⬇
Moderated by: Attribution + Legal Systems
⬇
Outcome: International Responsibility

Hypotheses

- H1: Cyber warfare activities significantly increase the risk of environmental damage.
- H2: Weak attribution mechanisms reduce the effectiveness of international accountability.
- H3: Strong legal frameworks enhance the enforcement of responsibility for cyber-induced environmental harm.

Findings and Discussion

The findings of this study highlight the growing complexity of cyber warfare as a source of environmental risk and a challenge for international law. The analysis demonstrates that cyber operations, although intangible in nature, can produce significant and often irreversible environmental consequences when directed against critical infrastructure systems.

First, the study confirms that cyber warfare represents a non-traditional but highly impactful source of environmental damage. Unlike conventional warfare, where environmental harm is typically a direct result of physical destruction, cyber warfare causes damage indirectly through the disruption of technological systems. This includes the failure of industrial control systems, leakage of hazardous materials, and breakdown of environmental monitoring mechanisms. These findings align with existing literature emphasizing the indirect yet severe consequences of cyber operations.

Second, the research identifies attribution as a central obstacle in establishing international responsibility. The technical characteristics of cyberspace—such as anonymity, spoofing, and the use of proxy networks—make it difficult to determine the origin of attacks. As a result, even when environmental damage occurs, holding perpetrators accountable under international law remains highly challenging. This significantly weakens deterrence mechanisms and undermines the effectiveness of legal frameworks.

Third, the study reveals that existing international legal instruments are insufficient to fully address cyber-induced environmental harm. While principles of international humanitarian law and environmental law provide a general framework, they were not designed to address the unique characteristics of cyber warfare. This creates legal gaps, particularly in relation to defining unlawful acts, establishing causation, and determining appropriate remedies.

Fourth, the findings emphasize the importance of institutional and technological capacity in mitigating environmental risks. States with advanced cybersecurity systems and strong regulatory frameworks are better equipped to prevent and respond to cyberattacks, thereby reducing environmental damage. Conversely, states with weaker infrastructure are more vulnerable to large-scale environmental harm.

Finally, the study highlights the need for a multi-level governance approach that integrates cybersecurity, environmental protection, and international law. Effective regulation of cyber warfare requires coordinated efforts at national, regional, and international levels, including the development of new legal instruments, enhanced cooperation between states, and the establishment of mechanisms for rapid response and accountability.

Methodology

Research Design

This study adopts a qualitative, doctrinal, and analytical research design to examine the legal and environmental implications of cyber warfare within the framework of international law. Given the abstract and evolving nature of cyber operations, as well as the limited availability of empirical datasets, a qualitative legal approach is considered the most appropriate for exploring the intersection between cyber warfare, environmental harm, and international responsibility.

The research is grounded in normative legal analysis, aiming to evaluate the adequacy of existing international legal frameworks in addressing environmental damage caused by cyber warfare. The study also incorporates elements of comparative legal analysis to identify differences in how various international norms and state practices respond to emerging cyber threats.

Data Sources

The study relies exclusively on secondary data sources, including:

- International legal instruments, such as:
    - The Charter of the United Nations
    - The Rome Statute of the International Criminal Court
    - Draft Articles on State Responsibility by the International Law Commission
- Authoritative legal frameworks and guidelines, including:
    - The Tallinn Manual 2.0 on the International Law Applicable to Cyber Operations
- Scholarly literature, including peer-reviewed journal articles, books, and academic studies related to:
    - Cyber warfare
    - Environmental law
    - International responsibility
- Case-based references and documented cyber incidents (where applicable), particularly those involving critical infrastructure disruption and environmental consequences.

Analytical Approach

The analysis is conducted through a combination of the following methods:

1. Doctrinal Legal Analysis

This method is used to interpret and evaluate existing legal norms governing cyber warfare and environmental protection. It involves examining legal texts, principles, and doctrines to determine their applicability to cyber-induced environmental harm.

Thematic Analysis

The study identifies and analyzes key themes emerging from the literature, including:

- Attribution challenges
- Environmental damage mechanisms
- Civil and criminal liability
- Gaps in international legal frameworks

These themes are systematically categorized and linked to the research objectives.

Comparative Analysis

A limited comparative approach is employed to assess how different legal systems and international frameworks address cyber warfare and environmental risks. This helps to highlight inconsistencies and identify best practices.

Conceptual Framework Application

The study utilizes a conceptual model framework that links cyber warfare activities to environmental outcomes through mediating and moderating variables. This framework serves as an analytical tool to:

- Explain the causal relationship between cyber operations and environmental damage

- Assess the role of legal and institutional factors in shaping accountability
- Identify key points of intervention for improving regulatory effectiveness

Limitations of the Study

Despite its analytical rigor, the study is subject to several limitations:

- The absence of primary empirical data limits the ability to quantitatively measure the impact of cyber warfare on the environment
- The rapidly evolving nature of cyber technologies and legal frameworks may affect the long-term applicability of findings
- Attribution challenges in cyberspace constrain the availability of verified case studies

Nevertheless, these limitations are addressed by relying on authoritative sources and adopting a robust analytical framework.

Study problem:

Under the current laws of international law, may governments and non-state actors be held responsible for environmental harm resulting from cyber warfare in which they participate? The research article's format:

The first half of this study focuses on The first part looks at cyber warfare in the context of existing international law norms by discussing the idea of cyber warfare and its adherence to those norms. The second portion addresses... The rules governing international civil liability for environmental harm caused by cyber warfare, as well as international criminal liability for egregious environmental offenses brought by these wars, handle international responsibility for such harm.

Cyber Warfare under Current International Law Rules

A distinction must be made between cyberattacks that may occur on a country's information systems and are criminalized according to its domestic law, and cyber warfare, which is prohibited under international law, as the first concept is narrower than the second accordingly. The concept of cyber warfare has evolved in parallel with the rapid development of digital technologies and the increasing integration of information systems into the core functions of modern states. Originating from the field of cybernetics—traditionally defined as the science of control and communication in machines—cyber warfare reflects a transformation in the nature of conflict, where the battlefield has shifted from physical terrain to an intangible and transnational digital environment (Al-Saidi et al., 2024). In this context, cyberspace encompasses complex networks of communication systems, data infrastructures, and remote control mechanisms that enable both civilian and military operations. The strategic importance of these systems has rendered them critical targets in contemporary conflicts, thereby elevating cyber warfare to a central dimension of international security.

Despite its growing significance, cyber warfare remains conceptually ambiguous, with no universally accepted definition in legal or academic discourse. This definitional uncertainty stems from the diverse forms and objectives of cyber operations, which range from espionage and data manipulation to large-scale disruption of critical infrastructure. Some scholars conceptualize cyber warfare as covert and highly sophisticated operations conducted through advanced digital tools aimed at infiltrating, disrupting, or destroying information systems and technological infrastructures (Al-Saidi et al., 2024). Others emphasize its strategic dimension, defining it as the use of information-based capabilities to undermine an adversary's decision-making processes, operational capacity, and overall security environment (Arquilla & Ronfeldt, 1993).

From a military perspective, cyber warfare involves not only the execution of digital attacks but also the integration of information technologies into the planning, coordination, and management of military operations. This includes the deployment of interconnected systems such as sensors, communication networks, databases, and artificial intelligence tools, which collectively enhance the precision, speed, and effectiveness of modern warfare. As a result, cyber capabilities have become as strategically significant as conventional military assets, fundamentally altering the balance of power in international relations (Arquilla & Ronfeldt, 1993; Robinson et al., 2015).

A more state-centric definition views cyber warfare as actions undertaken by a state to penetrate or disrupt the information systems and networks of another state with the intention of causing significant damage or incapacitation (Abdul Ghaffar, 2016). However, this perspective has been increasingly challenged by the growing involvement of non-state actors, including private entities, hacker groups, and transnational organizations. Advances in technology and the widespread accessibility of cyber tools have enabled these actors to participate in cyber conflicts, thereby expanding the scope of cyber warfare beyond traditional state-to-state interactions (Farhat, 2021). This evolution has blurred the boundaries between warfare, crime, and hybrid conflict, complicating both legal classification and regulatory responses.

A common feature across most definitions is the targeting of information systems and digital infrastructures with the aim of compromising the confidentiality, integrity, or availability of data. Such operations may involve unauthorized access, data theft, system manipulation, or the complete disruption of critical services. The inherent anonymity of cyberspace, combined

with the technical complexity of cyber operations, makes it exceptionally difficult to identify perpetrators and establish accountability, thereby posing significant challenges for the application of international law (Qashti, 2024; Schmitt, 2014).

Cyber warfare differs fundamentally from traditional warfare in several respects. Conventional warfare is typically characterized by clearly defined actors, physical battlefields, and formal declarations of conflict. In contrast, cyber warfare operates across decentralized and borderless networks, often without clear temporal or spatial boundaries. Its objectives are frequently ambiguous, and its methods rely on digital tools that can be deployed remotely and instantaneously. These characteristics not only complicate the legal regulation of cyber warfare but also amplify its potential impact, particularly when critical infrastructure is targeted (Saud, 2018; Stevens, 2012).

Furthermore, the ongoing revolution in military affairs has significantly reshaped the nature of conflict by integrating cyber capabilities into broader strategic frameworks. This transformation has enhanced the destructive potential of both conventional and non-conventional weapons while simultaneously introducing new forms of conflict that operate below the threshold of traditional warfare. The emergence of so-called "gray zone" or "hybrid" conflicts, often characterized by continuous low-intensity cyber operations, reflects a shift toward persistent and multifaceted forms of confrontation (Farhat, 2021; Hadji-Janev, 2020).

Importantly, the environmental implications of cyber warfare represent a critical yet often overlooked dimension of this phenomenon. Cyberattacks targeting infrastructure systems—such as energy networks, water treatment facilities, and industrial control systems—can lead to significant environmental harm, including pollution, ecosystem degradation, and long-term ecological disruption. These consequences underscore the need to integrate environmental considerations into the conceptual and legal understanding of cyber warfare, thereby expanding its scope beyond purely security-related concerns (Cassotta & Pettersson, 2019; Schmitt, 2014).

In sum, cyber warfare constitutes a complex and evolving form of conflict that challenges traditional notions of warfare, legal responsibility, and environmental protection. Its multifaceted nature, characterized by technological sophistication, transnational reach, and the involvement of diverse actors, necessitates a comprehensive and interdisciplinary approach to its study and regulation. As cyber capabilities continue to advance, the need for clearer definitions, more robust legal frameworks, and greater international cooperation becomes increasingly urgent.

Cyberattacks are also large-scale, and herein lies their danger to the environment, as they have a significant impact on the vital interests of the state by targeting its infrastructure. Cyber warfare is based on the use of information and communication technology in an informational environment within an offensive or defensive military strategy adopted by a state, aiming to disrupt or control the enemy's resources. Its targets may affect both tangible and intangible areas, and the level of its severity may vary depending on the circumstances.(Robinson, Jones, &Janicke, 2015, p. 10)

The distinction between cyber warfare and broader forms of network-based conflict constitutes a foundational issue in contemporary security and legal scholarship. Cyber warfare is typically understood as state-centered conflict involving coordinated operations targeting strategic infrastructure and national security systems, whereas network warfare encompasses a wider spectrum of activities, including actions carried out by non-state actors, criminal organizations, and decentralized digital networks (Arquilla & Ronfeldt, 1993; Stevens, 2012). Despite these conceptual differences, both forms of conflict share a common capacity to generate large-scale disruption and pose significant risks to state stability and environmental integrity. Indeed, the increasing militarization of cyberspace, coupled with the development of autonomous and highly sophisticated cyber weapons, has blurred the boundaries between traditional warfare and digitally mediated conflict, thereby complicating both legal classification and regulatory responses (Krepinevich, 2012; Robinson et al., 2015).

The growing strategic reliance on cyberspace has prompted a gradual but notable shift in the position of states regarding the applicability of international law to cyber operations. While early debates questioned whether existing legal frameworks were suitable for governing cyber warfare, there is now a broad consensus that international law, including the principles of the United Nations Charter and international humanitarian law, applies to cyber activities conducted by states (Hadji-Janev, 2020; Schmitt, 2014). However, this acceptance remains accompanied by significant interpretative challenges, particularly concerning the classification of cyber operations as "use of force" or "armed attacks" within the meaning of Article 51 of the United Nations Charter (Melzer, 2011; Tsagourias & Buchan, 2015). These challenges are further exacerbated by the absence of binding international instruments specifically designed to regulate cyber warfare, leaving states to rely on non-binding frameworks such as the Tallinn Manual, which, although authoritative, reflects particular doctrinal perspectives and lacks universal acceptance (Schmitt, 2017; Robinson et al., 2015).

In this evolving legal landscape, state practices reveal divergent approaches to cyber governance, ranging from strict control of digital infrastructure to the integration of cyber capabilities into broader military strategies, as well as efforts to adapt existing international legal norms to the cyber domain (Hadji-Janev, 2020). These trends underscore the necessity of developing a coherent and universally accepted legal framework capable of addressing the unique characteristics of cyber warfare, including its transboundary nature, rapid escalation potential, and significant environmental implications (Harris, 2022; Dinniss, 2012).

The environmental dimension of cyber warfare represents a particularly critical yet underexplored aspect of this phenomenon. Cyber operations targeting critical infrastructure—such as energy systems, water treatment facilities, transportation networks, and industrial control systems—can result in severe and long-lasting environmental damage, even in the absence of direct physical destruction (Kallberg & Burk, 2013; Schmitt, 2014). For example, disruptions to dam control systems, power grids, or chemical plants may lead to flooding, toxic emissions, or large-scale pollution events, with devastating consequences for ecosystems and human populations (Kallberg & Burk, 2013; Cassotta & Pettersson, 2019). These impacts often extend beyond immediate damage, contributing to long-term ecological degradation, resource depletion, and environmental instability.

A key characteristic of cyber-induced environmental harm is its indirect and immaterial nature. Unlike conventional environmental damage caused by physical force, cyberattacks typically target digital systems that control or regulate environmental processes, thereby creating complex causal chains between the initial act and its environmental consequences (Mohammed, 2022; Rakha, 2024). This indirectness complicates the process of establishing causation, which remains a fundamental requirement for triggering international responsibility (International Law Commission, 2001). Moreover, the speed and scale at which cyberattacks can propagate across interconnected systems amplify their potential impact, enabling widespread environmental damage within a relatively short period (Robinson et al., 2015).

From a legal perspective, the determination of international responsibility for environmental harm caused by cyber warfare raises profound challenges. The concept of internationally wrongful acts, as articulated by the International Law Commission, provides a general framework for attributing responsibility to states; however, its application in cyberspace is hindered by the inherent difficulties of attribution and the complexity of cyber operations (ILC, 2001; Schmitt, 2017). In many cases, cyberattacks involve multiple actors, including state and non-state entities, operating across different jurisdictions, thereby complicating the identification of responsible parties and the allocation of liability (Kallberg & Burk, 2013; Chabinsky, 2021).

Within this context, international civil liability emerges as a crucial mechanism for addressing environmental damage caused by cyber warfare. Such liability is based on the existence of an unlawful act, environmental harm, and a causal link between the two (Mohammed, 2022; Lagmash, 2017). Notably, the concept of environmental harm has evolved to encompass not only physical destruction but also indirect impacts, including the disruption of environmental monitoring systems and the loss of critical environmental data necessary for risk assessment and disaster prevention (United Nations, 2001; Katagiri, n.d.). This expanded understanding reflects the changing nature of environmental risks in the digital age and highlights the need for adaptive legal frameworks capable of addressing both tangible and intangible forms of harm.

Ultimately, the increasing complexity of cyber warfare and its environmental consequences underscores the inadequacy of existing legal frameworks and the urgent need for reform. Addressing these challenges requires the development of specialized international norms, enhanced mechanisms for attribution and accountability, and greater integration of environmental considerations into cyber governance strategies (Schmitt, 2014; Tsagourias & Buchan, 2015). Without such efforts, the international community risks facing a growing gap between the realities of cyber conflict and the legal tools available to regulate its environmental impact.

cause-and-effect connections Representing a point of convergence between the needs of law and physical and scientific theories, it is an entirely scientific, not a legal, topic. It entails analyzing the degree of connection between actual facts and events and a potential result, as well as providing a logical conclusion to a legal question based on them. Nevertheless, these sciences are unable to establish the existence of this link with absolute certainty. It is the A In the environmental area, it is challenging to establish the clear and direct link between cause and effect, particularly as a consequence of cyber operations, but it is also difficult to show that this connection adheres to established general principles (Lagmash, 2017, p. 198)

And taking into account that Due to the dispersed nature of cyberwar attacks and the challenges in pinpointing their origin, it is more difficult to demonstrate the causal connection in cyberwarfare attacks than in traditional acts.

Establishing a causal relationship between a cyber operation and the resulting environmental harm represents a complex and methodologically demanding process that integrates both legal reasoning and advanced scientific analysis. In contrast to conventional forms of environmental damage, where causal links may be directly observable, cyber-induced harm requires a multi-layered evidentiary approach grounded in digital forensics and environmental science. The process begins with the technical examination of digital data, including the tracing of data transmission pathways, the analysis of network logs, and the identification of malicious software used in the cyberattack. These procedures are essential for reconstructing the sequence of events and determining the operational mechanisms through which the cyber incident translated into physical environmental consequences (AllahRakha, 2024).

However, the establishment of causation does not rely solely on digital evidence. It must also be supported by scientifically rigorous environmental assessments designed to measure the extent and nature of the harm. This includes the systematic collection and analysis of environmental samples—such as air, water, and soil—both prior to and following the cyber incident. Such assessments are conducted in accordance with internationally recognized scientific standards to ensure their reliability, objectivity, and admissibility in legal proceedings. The integration of digital forensic analysis with empirical environmental

data is therefore critical for substantiating claims of environmental damage and for meeting the evidentiary thresholds required in international dispute resolution and judicial processes (Al-Rubaiee & Al-Owaidi, 2022; Mohammed, 2022).

Within this analytical framework, the attribution of environmentally harmful cyber operations emerges as one of the most challenging issues in contemporary international law. The inherent characteristics of cyberspace—particularly anonymity, decentralization, and the capacity for technical obfuscation—enable perpetrators to conceal their identity and obscure the origin of attacks. Techniques such as IP address spoofing, the use of botnets, and the deployment of proxy servers significantly complicate efforts to trace cyber operations to specific actors. As a result, establishing legal responsibility for cyber-induced environmental harm is often hindered by the difficulty of obtaining clear and conclusive attribution (Melzer, 2011; Schmitt, 2017).

The framework for attributing cyber operations to states is primarily derived from the principles articulated in the Draft Articles on Responsibility of States for Internationally Wrongful Acts adopted by the International Law Commission. According to these principles, a state incurs international responsibility when an act or omission attributable to it constitutes a breach of an international obligation (International Law Commission [ILC], 2001). In the context of cyber warfare, attribution may arise under several conditions, the most straightforward of which is direct attribution. This occurs when the cyber operation causing environmental harm is conducted by official state organs, including military cyber units or intelligence agencies acting within their institutional mandates.

Direct attribution is particularly relevant in cases where state authorities explicitly authorize or conduct cyber operations targeting environmentally sensitive infrastructure. For instance, cyberattacks directed at water treatment facilities, energy systems, or environmental monitoring networks may be attributable to the state if they are executed by governmental actors or under formal command structures. In such scenarios, the existence of official orders, operational directives, or documented involvement of state agencies serves as key evidence in establishing responsibility (Mshrf, 2022; Schmitt, 2017). Nevertheless, even in cases of apparent direct involvement, the evidentiary burden remains substantial, requiring a combination of technical, legal, and intelligence-based proof to satisfy international legal standards.

Beyond direct attribution, the complexity of cyber operations often necessitates consideration of indirect forms of responsibility, including situations where states exercise control over non-state actors or fail to prevent harmful activities originating from their territory. These dimensions further illustrate the evolving nature of international responsibility in cyberspace and highlight the need for more refined legal frameworks capable of addressing the unique challenges posed by cyber-induced environmental harm (Chabinsky, 2021; Tsagourias & Buchan, 2015).

Overall, the interplay between technical evidence, scientific validation, and legal standards underscores the multidisciplinary nature of establishing responsibility for environmental damage caused by cyber warfare. It also reveals significant gaps in current international law, particularly in relation to attribution, causation, and evidentiary requirements, thereby reinforcing the urgency of developing more comprehensive and adaptive regulatory approaches.

Table 1. Conceptual Framework of Cyber Warfare and Environmental Impact

Component	Type of Variable	Description	Key Mechanisms	Impact Level
Cyber Warfare Activities	Independent Variable	Digital military operations targeting systems, networks, and infrastructure	- Malware attacks - System infiltration - Infrastructure disruption	High (Trigger factor)
Critical Infrastructure Disruption	Mediating Variable	Breakdown of essential systems (energy, water, transport, industry)	- Power grid failure - Water system disruption - Industrial control system malfunction	Very High
Environmental Damage	Dependent Variable	Direct and indirect harm to natural ecosystems	- Pollution (air, water, soil) - Toxic leakage - Ecosystem destruction	Severe / Long-term
Attribution Capability	Moderating Variable	Ability to identify responsible actors in cyberspace	- Technical tracing - Digital forensics - Intelligence cooperation	Weakens/Strengthens accountability

Legal Framework Strength	Moderating Variable	Effectiveness of international law in regulating cyber warfare	- International humanitarian law - Tallinn Manual - State responsibility rules	Conditional
International Responsibility	Outcome Variable	Legal consequences for environmental harm	- Civil liability (compensation) - Criminal liability (ICC) - State accountability	Final outcome

Table 2. Key Findings and Legal Implications of Cyber Warfare on the Environment

Finding	Explanation	Legal Implication	Policy Implication
Cyber warfare causes indirect but severe environmental damage	Damage occurs through disruption of infrastructure rather than direct physical attack	Expands interpretation of environmental harm under international law	Need to include cyber risks in environmental protection policies
Attribution is the main legal challenge	Difficulty in identifying perpetrators due to anonymity of cyberspace	Weakens application of state responsibility principles	Requires development of advanced cyber attribution mechanisms
Existing international law is insufficient	Current frameworks were designed for traditional warfare	Legal gaps in regulating cyber-induced environmental harm	Necessity for new international treaties or protocols
Critical infrastructure is highly vulnerable	Energy, water, and industrial systems are primary targets	Protection of civilian infrastructure becomes a legal priority	Strengthening cybersecurity of environmental infrastructure
Civil liability mechanisms are underdeveloped	Compensation frameworks are unclear in cyber context	Need for clearer standards of liability and compensation	Establish international compensation mechanisms/funds
Criminal liability is limited but evolving	Environmental cyber crimes may fall under ICC jurisdiction	Expansion of environmental crimes (e.g., ecocide concept)	Support international recognition of cyber environmental crimes
Environmental damage is long-term and transboundary	Effects extend beyond borders and persist over time	Requires international cooperation and shared responsibility	Promote global governance and joint response systems

The attribution of cyber operations in the context of environmental harm presents one of the most complex challenges in contemporary international law, particularly when state responsibility is examined in relation to indirect forms of involvement. Indirect attribution arises in situations where a state does not directly conduct a cyber operation but provides support, coordination, or direction to non-state actors or affiliated groups engaged in disruptive cyber activities. In such cases, the conduct may be legally attributable to the state if it can be demonstrated that these actors operated under its effective control or direction, or if the state conferred upon them elements of official authority through formal or informal arrangements . However, establishing such attribution remains highly problematic in practice, as it requires substantial evidentiary support, including technical data, communication records, and verifiable links between state authorities and non-state entities.

In parallel, international law recognizes the principle of due diligence, whereby a state may incur responsibility not only for direct or indirect actions but also for its failure to prevent harmful activities originating from its territory or infrastructure. This "breach of the duty of due care" occurs when a state neglects to take reasonable and necessary measures to prevent cyber operations that result in environmental damage to other states. The application of this principle is grounded in the broader obligation of states to ensure that activities within their jurisdiction do not cause transboundary harm. Nevertheless, proving such a breach requires demonstrating that the state was aware, or should reasonably have been aware, of the risk of such cyberattacks and failed to implement adequate technical, legislative, or cooperative measures to mitigate them. This evidentiary burden further complicates the enforcement of international responsibility in cyberspace.

These attribution standards are closely linked to the established doctrines of effective control and effective will, which have traditionally been applied in the context of armed conflicts involving non-state actors. Their application in cyberspace necessitates both material and legal assessments, including the evaluation of financial support, operational coordination, training, and communication channels, as well as the existence of formal or quasi-formal relationships between states and cyber actors. The complexity of these assessments underscores the urgent need for the development of specialized legal frameworks capable of addressing the unique characteristics of cyber operations and their environmental consequences.

Moreover, cyber operations conducted by non-state actors, such as private entities, organized groups, or individuals, do not automatically engage state responsibility unless a sufficient degree of state involvement can be established. Nevertheless, such actors may still be subject to prosecution under national or international legal systems where jurisdictional and legal conditions permit. This reflects the growing recognition that accountability for environmental harm in cyberspace must extend beyond traditional state-centric models and incorporate a broader range of actors.

The legal consequences of environmental damage caused by cyber warfare are primarily articulated through the framework of international civil liability, which seeks to ensure the cessation of harmful acts and the provision of appropriate remedies. This includes the obligation to halt ongoing cyber operations and to take immediate measures to mitigate their effects, such as restoring compromised systems and stabilizing affected ecosystems. Additionally, responsible parties are required to undertake restorative actions aimed at re-establishing environmental conditions as close as possible to their original state. These measures play a crucial role in enhancing environmental resilience and reducing the likelihood of future harm.

Financial compensation constitutes another essential dimension of civil liability, requiring responsible actors to cover the costs associated with environmental restoration, resource degradation, and the broader socio-economic impacts of environmental damage. This may include compensation for the loss of natural resources, deterioration of environmental quality, and harm suffered by affected populations. Such mechanisms are vital for ensuring justice and reinforcing the principle of accountability in cases of cyber-induced environmental harm.

At the same time, international criminal law is increasingly being invoked as a mechanism for addressing severe environmental damage resulting from cyber operations. While cyberattacks are not explicitly defined as international crimes, their consequences may fall within the scope of existing categories such as war crimes or crimes against humanity, particularly when they result in widespread, long-term, and severe environmental harm. The growing discourse surrounding the recognition of environmental crimes, including the emerging concept of ecocide, reflects a broader shift toward strengthening legal protections for the environment in both physical and digital domains.

Empirical Evidence and Case-Based Analysis

Although cyber warfare is often characterized by the absence of publicly available quantitative datasets, a growing body of documented cyber incidents provides valuable empirical evidence regarding its environmental implications. This study incorporates a case-based empirical analysis of major cyber incidents targeting critical infrastructure, illustrating how cyber operations can produce direct and indirect environmental harm.

One of the most frequently cited cases is the Stuxnet cyberattack (2010), widely attributed to state-sponsored actors targeting Iran's nuclear facilities. While the primary objective of the attack was to disrupt uranium enrichment processes, the operation demonstrated the capacity of cyber tools to interfere with industrial control systems governing sensitive technological environments. By manipulating centrifuge operations, Stuxnet caused physical degradation of equipment, highlighting the potential for cyber operations to trigger environmental risks, particularly in nuclear or chemical facilities where system failures may lead to hazardous leakage or contamination (Kushner, 2013; Zetter, 2014).

Another significant case is the Ukraine power grid cyberattacks (2015–2016), which resulted in large-scale electricity outages affecting hundreds of thousands of civilians. These attacks targeted supervisory control and data acquisition (SCADA) systems, disrupting energy distribution networks. While the immediate consequence was a loss of electricity, the broader implications included risks to environmental safety systems, such as the failure of water treatment plants and disruption of environmental monitoring processes. These incidents illustrate how cyberattacks on energy infrastructure can indirectly contribute to environmental degradation and public health risks (Lee, Assante, & Conway, 2016; E-ISAC, 2016).

A further example can be observed in cyber incidents targeting water treatment facilities, such as the attempted breach of a water treatment plant control system in Florida (2021). In this case, attackers sought to manipulate chemical levels in the water supply by remotely accessing operational systems. Although the attack was detected and neutralized before causing harm, it provides concrete evidence of how cyber intrusions can directly threaten environmental quality and human health through the contamination of essential resources (CISA, 2021).

In addition, cyber operations targeting oil and gas infrastructure have demonstrated the environmental risks associated with industrial system disruption. Attacks on pipeline control systems or refinery operations can lead to system malfunctions, oil spills, or gas leaks, thereby causing significant ecological damage. For instance, ransomware attacks on energy companies have raised concerns about the vulnerability of critical infrastructure and the potential for environmental disasters resulting from compromised operational integrity (Greenberg, 2019).

From an analytical perspective, these cases confirm the causal chain proposed in the conceptual framework of this study. Cyber warfare activities targeting critical infrastructure act as the primary trigger, leading to system disruption and operational failure. These disruptions, in turn, create conditions for environmental damage, either directly through the release of hazardous materials or indirectly through the breakdown of monitoring and control systems. The severity of the environmental impact is influenced by moderating factors such as the resilience of infrastructure systems, the effectiveness of cybersecurity measures, and the capacity of states to respond to cyber incidents.

Despite these insights, the empirical analysis also reveals significant limitations. The attribution of cyber incidents remains highly contested, with many cases lacking definitive public evidence linking attacks to specific state actors. This reinforces the argument that attribution challenges continue to undermine the enforcement of international responsibility. Furthermore, the absence of standardized reporting mechanisms for cyber-induced environmental harm limits the availability of comprehensive datasets, highlighting the need for improved international cooperation in data sharing and incident documentation.

Overall, the empirical evidence demonstrates that cyber warfare is not merely a digital phenomenon but a tangible source of environmental risk. The analyzed cases provide concrete support for the study's central hypothesis that cyber operations targeting critical infrastructure can lead to significant environmental damage, thereby necessitating the development of more robust legal and regulatory frameworks to address this emerging threat.

Characterization of environmental crimes as crimes under the Statute of the International Criminal Court

Although international criminal law does not explicitly mention cyber-attacks, digital means are merely a "tool" for committing the criminal act. In the case of disabling the cooling systems of a nuclear power plant through a cyber-attack, the act falls within the scope of an environmental crime even if the means are digital (Schmitt, 2017, p. 326).

The International Criminal Court cannot consider environmental crimes if they fall within the framework of a war crime, a crime against humanity, or genocide, whenever committed under circumstances that fulfill the elements of these crimes (Rome Statute of the International Criminal Court, 1998, Art. 8/2b).

Accordingly, contemporary international legal scholarship seeks to establish the concept of environmental crimes as international crimes, by defining the legal framework that ensures their inclusion within the subject-matter jurisdiction of the International Criminal Court.

The characterization of environmental crimes is based on two essential elements: first, the occurrence of widespread and severe environmental damage, and second, the presence of criminal intent manifested in knowledge and deliberate causation of serious harm to the natural environment. For example, certain acts such as the deliberate use of contaminated weapons leading to widespread pollution of water, air, or soil are considered war crimes when linked to an armed conflict and taking on a hostile military character(Bin Makhlouf, 2019, pp. 76–78)

International humanitarian law already includes explicit references to environmental protection during armed conflicts, as in Article 8 of the Rome Statute, which criminalizes widespread and long-term damage to the natural environment when criminal intent is established(Al-Azzawi, 2022, p. 238).In addition,Classifying an act as an international environmental crime requires specific conditions: the damage must be widespread, long-term, and serious, and it must be caused by a deliberate act, not merely by negligence or oversight.(Abdul Hussein, 2024, p. 55)

In this context, recent years have witnessed several initiatives aimed at including the crime of "ecocide" as a fifth crime within the Rome Statute, through the formulation of a precise definition and objective criteria for the elements of gravity, criminal intent, and the international nature of the crime, in response to global environmental challenges and the urgent need to provide international criminal protection for the environment as a fundamental collective interest(Mwanza, 2023, p. 190)

Therefore, it can be said that the legal classification of environmental crimes within the framework of the International Criminal Court is characterized by a degree of flexibility that allows for their inclusion under existing texts whenever the objective conditions are met, with a growing trend in international jurisprudence and legislation towards enshrining more explicit and clear protection for the environment at the highest international judicial levels.

Criminal penalties for environmental crimes before the International Criminal Court

The court relies on the severity associated with the environmental act, the perpetrator's behavior, and the availability of specific criminal intent (such as intentional harm with widespread, long-term effects on the environment and humans) in imposing penalties. These penalties include:

Imprisonment for fixed periods: This may reach thirty years or life imprisonment in crimes with catastrophic consequences, as stated in Article 77/1 of the Basic Law(Rome Statute of the International Criminal Court, 1998, art. 77/1)

- Financial penalty: The court has the right to impose a fine, the amount of which is determined by the court according to the value of the environmental crime's damage and its ongoing impact(Bin Makhlouf, 2019, p. 84)

- Confiscation and financial measures: It is permissible to order the confiscation of funds, assets, and materials used in the environmental crime and the profits generated therefrom, while obligating the perpetrator to pay compensation to the victims or restore the situation to its previous state(Al-Azzawi, 2022, p. 242)The court may impose reparative measures and restoration measures, especially concerning crimes whose harm affects victims collectively and has long-term effects, such as rehabilitating the damaged land, repairing the water system, and providing health and environmental rehabilitation for the affected local communities(Minkovap. 11)This is stipulated in Article 75 of the Court's Statute regarding "Orders related to reparation" and the establishment of a special fund for compensating victims. Compensation may, as much as possible, include repairing the deteriorated environmental situation.(Rome Statute of the International Criminal Court, 1998, art. 75)

Conclusion and Policy Recommendations

The growing intersection between cyber warfare and environmental harm represents one of the most pressing challenges confronting contemporary international law. The findings of this study demonstrate that cyber operations, while conducted in a non-physical domain, are capable of producing significant and often irreversible environmental consequences through the disruption of critical infrastructure and essential ecological systems. As the scale, sophistication, and frequency of cyber conflicts continue to increase, the risks posed to environmental sustainability and human security are becoming more pronounced, thereby necessitating a comprehensive legal and institutional response.

A central conclusion of this research is that the distinction between cyber warfare and ordinary cyberattacks is of critical importance, as it directly influences the applicability of international legal norms, particularly those governing the conduct of hostilities and the attribution of international responsibility. The absence of a universally accepted definition of cyber warfare contributes to legal ambiguity and undermines the consistent application of international humanitarian and environmental law. Furthermore, the expansion of environmental damage in the cyber context—extending beyond physical destruction to include non-material harm such as the disruption of environmental monitoring systems and the loss of critical environmental data—requires a reconceptualization of environmental harm within international legal frameworks.

The study also highlights the persistent difficulties associated with attribution in cyberspace, which remain a fundamental obstacle to effective accountability. The technical characteristics of cyber operations, including anonymity, decentralization, and the involvement of non-state actors, significantly complicate the process of identifying responsible parties and applying existing doctrines of state responsibility. As a result, the current legal framework appears insufficient to address the complexity of cyber-induced environmental harm, thereby creating gaps in both civil and criminal accountability mechanisms.

At the level of international criminal law, the analysis reveals a growing trend toward expanding the legal recognition of environmental crimes, including those facilitated by cyber operations. While existing provisions within the Rome Statute provide a degree of flexibility that allows certain acts to be prosecuted under established categories, there is an increasing need to explicitly recognize severe environmental harm—potentially including cyber-induced damage—within the framework of international criminal justice. The emerging discourse surrounding the codification of ecocide reflects this evolving normative landscape and underscores the importance of strengthening legal protections for the environment.

In light of these findings, it becomes evident that addressing the environmental consequences of cyber warfare requires a multidimensional and forward-looking approach. There is a clear need for the development of specialized international legal rules that take into account the unique characteristics of cyberspace, particularly with regard to attribution, causality, and the scope of environmental harm. Strengthening international cooperation is equally essential, especially in areas such as technical information exchange, joint cyber defense mechanisms, and coordinated responses to environmental cyber incidents. Such cooperation would enhance the ability of states to detect cyber threats, accurately attribute responsibility, and respond effectively to environmental damage.

Moreover, the establishment of international compensation mechanisms, including dedicated funds supported by states and relevant private actors, could play a crucial role in addressing the financial and ecological consequences of cyber-induced environmental harm. Preventive measures must also be prioritized through the modernization of digital infrastructure and the integration of environmental considerations into national cybersecurity strategies. This includes the development of environmental cybersecurity policies aimed at protecting critical infrastructure and minimizing the risk of large-scale ecological disruption.

Ultimately, the protection of the environment in the age of cyber warfare requires a fundamental rethinking of traditional legal approaches and the adoption of integrated governance frameworks that bridge the gap between cybersecurity, environmental protection, and international law. Only through such comprehensive and coordinated efforts can the international community effectively respond to the evolving challenges posed by cyber warfare and ensure the sustainable protection of environmental resources for future generations.

Ethical Approval and Consent to Participate

This study does not involve human participants, human data, or animal subjects. Therefore, ethical approval and consent to participate were not required. The research is based entirely on publicly available legal documents, scholarly literature, and secondary data sources.

Consent for Publication

All authors have read and approved the final version of the manuscript and consent to its publication.

Availability of Data and Materials

The data supporting the findings of this study are derived from publicly accessible sources, including international legal documents, academic publications, and documented cyber incidents. No proprietary datasets were used. Additional information can be provided by the corresponding author upon reasonable request.

Competing Interests

The authors declare that they have no competing financial or non-financial interests that could have influenced the work reported in this paper.

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Authors' Contributions

Brahmi Hanane contributed to the conceptualization, literature review, legal analysis, and drafting of the manuscript. Noureddine Khouidem contributed to the methodology, analytical framework, critical revision, and final approval of the manuscript. All authors have read and approved the final version of the manuscript.

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Data Availability Statement

All data used in this study are publicly available and properly cited within the manuscript. No datasets were generated or analyzed that require restricted access.

Declaration of AI Use

The authors declare that artificial intelligence tools were used solely for language editing and formatting purposes. All intellectual content, analysis, and conclusions are the original work of the authors.

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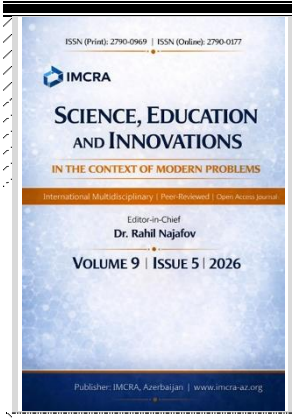
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RESEARCH ARTICLE

Intra-Family Conflict and Its Socio-Psychological, Behavioral, and Structural Determinants in the Islamic Republic of Iran: An Integrative Multidimensional Analysis

Rahimirad Hossein, Ayyub
Dr.
Tabriz University of Medical Sciences, Tabriz
Iran
Email: rahimirad87@gmail.com

Keywords
Family conflict; Marital instability; Social support; Adolescent behavior; Domestic violence; Substance abuse; Emotional regulation; Family systems theory; Iran; Socio-psychological dynamics; Child development; Deviant behavior

Abstract
This study provides a comprehensive and multidimensional analysis of intra-family conflicts in the Islamic Republic of Iran, focusing on their socio-psychological, behavioral, and structural determinants. Drawing upon empirical data and theoretical frameworks from family systems theory, developmental psychology, and sociological research, the study examines how family dynamics, communication patterns, emotional regulation, and socio-cultural factors contribute to the emergence and escalation of family conflict. The findings indicate that family dysfunction—characterized by low levels of social support, ineffective communication, emotional detachment, and structural imbalances—plays a critical role in shaping maladaptive behavioral outcomes, particularly among adolescents. Regression analysis demonstrates that social support is a statistically significant predictor of family satisfaction, while individual-level factors such as emotional awareness show limited explanatory power. Furthermore, the study highlights the role of intergenerational transmission, substance abuse, domestic violence, and mismanagement of leisure time as key risk factors contributing to family instability. The results also emphasize the importance of socio-cultural norms, religious values, and economic conditions in shaping family relationships in the Iranian context. In addition, the study provides evidence that exposure to chronic family conflict significantly disrupts emotional security and cognitive development among children, increasing their susceptibility to behavioral disorders and social maladjustment. The findings further suggest that adolescents raised in conflict-prone environments are more likely to engage in high-risk behaviors, including substance abuse and delinquency, as a result of impaired emotional regulation and weak parental supervision. Moreover, the analysis reveals that structural inequalities, such as imbalanced power relations and economic stress, intensify relational tensions within households. The study also identifies communication breakdown and lack of mutual understanding between partners as central mechanisms driving marital instability. Importantly, the research demonstrates that even economically stable families are not immune to conflict, particularly when cultural expectations and modern lifestyle demand intersect. The integration of quantitative findings with theoretical insights allows for a more nuanced understanding of family conflict as a dynamic and context-dependent phenomenon. Finally, the study underscores the need for holistic intervention strategies that address both individual psychological processes and broader socio-cultural structures in order to promote sustainable family cohesion and social well-being.

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Introduction

The family, as the fundamental unit of society, plays a central role in shaping individual behavior, social values, and psychological development. It functions not only as a primary source of emotional support and socialization but also as a key institution for the transmission of cultural norms and ethical standards. Within this context, the quality of intra-family relationships significantly influences both individual well-being and broader societal stability.

However, contemporary social transformations, including urbanization, economic pressures, and shifting cultural values, have contributed to increasing levels of family conflict across many societies. In the Islamic Republic of Iran, these dynamics are further shaped by a complex interplay of traditional values, religious norms, and modern socio-economic challenges. As a result, intra-family conflict has emerged as a critical social issue with far-reaching psychological, behavioral, and structural implications.

Existing research suggests that family conflict is not merely a private matter but a significant public concern, as it is closely associated with a wide range of negative outcomes, including mental health disorders, substance abuse, domestic violence, and juvenile delinquency (Cummings & Davies, 2010; Repetti et al., 2011; Karney & Bradbury, 2020). Children raised in conflict-prone family environments are particularly vulnerable, as exposure to parental discord disrupts emotional security, impairs cognitive development, and increases the likelihood of maladaptive behavior (Davies & Martin, 2013; McCoy et al., 2013).

In the Iranian context, intra-family conflict is influenced not only by economic and structural factors but also by socio-cultural and religious dimensions. Family relationships are deeply embedded in normative frameworks that emphasize moral responsibility, social cohesion, and hierarchical role structures. While these frameworks can promote stability, they may also contribute to conflict when expectations are unmet or when traditional roles clash with modern lifestyles.

Moreover, recent studies indicate that even families with adequate economic resources may experience significant internal tensions due to factors such as ineffective communication, emotional detachment, and the mismanagement of leisure time among adolescents. This suggests that family conflict cannot be explained solely by material conditions but must be understood as a multidimensional phenomenon encompassing psychological, social, and cultural variables.

The present study aims to provide a comprehensive analysis of intra-family conflict in Iran by integrating empirical findings with established theoretical frameworks. Specifically, it seeks to:

1. Identify the key socio-psychological and structural determinants of family conflict;
2. Examine the impact of family dynamics on adolescent behavior and development;
3. Analyze the role of communication, social support, and emotional regulation in shaping family satisfaction;
4. Explore the broader social and policy implications of family conflict.

By adopting a multidisciplinary approach, this study contributes to the growing body of literature on family conflict and provides practical insights for policymakers, educators, and mental health professionals seeking to promote family stability and social well-being.

Methodology

Research Design

This study adopts a mixed-method analytical approach, integrating both qualitative and quantitative techniques to examine intra-family conflict in the Islamic Republic of Iran. The research combines empirical statistical analysis with a narrative literature review, allowing for a comprehensive exploration of socio-psychological, behavioral, and structural determinants of family conflict.

The study is grounded in an interdisciplinary framework, drawing upon family systems theory, developmental psychology, and sociological perspectives to provide a multidimensional understanding of family dynamics.

Data Collection and Sample

The empirical component of the study is based on data collected from a sample of N = 132 participants, representing family units within the Iranian socio-cultural context. The sample includes individuals of varying age groups, educational backgrounds, and socio-economic statuses, ensuring diversity and representativeness.

Data were obtained using structured questionnaires designed to measure key variables, including:

- family satisfaction;
- perceived social support;

- emotional awareness (conscious emotion);
- dependency on others;
- communication patterns within the family.

Variables and Measures

The study focuses on the following core variables:

- Dependent Variable:
  - Family Satisfaction
- Independent Variables:
  - Social Support
  - Conscious Emotional Awareness
  - Dependency on Others

Statistical indicators include:

- correlation coefficients (r);
- regression coefficients (β);
- t-values;
- significance levels (p-values).

These measures are used to evaluate the strength, direction, and statistical significance of relationships between variables.

Data Analysis

Quantitative data were analyzed using correlation and regression analysis to determine the predictive relationships between independent variables and family satisfaction.

The results indicate that:

- social support is a statistically significant predictor of family satisfaction ($p < 0.01$);
- emotional awareness and dependency on others show limited or statistically insignificant effects.

In addition to statistical analysis, qualitative interpretation was employed to contextualize findings within broader socio-cultural and psychological frameworks.

Literature Review Method

The theoretical component of the study follows a narrative review methodology, synthesizing peer-reviewed literature published in leading academic databases, including:

- Web of Science
- Scopus
- Google Scholar

The selection criteria for sources included:

- relevance to family conflict, marital instability, and child development;
- publication in peer-reviewed journals;
- emphasis on recent studies (primarily within the last 10–15 years), supplemented by foundational theoretical works.

This approach allows for the integration of classical theories with contemporary empirical findings.

Limitations

Despite its contributions, the study has certain limitations:

- the sample size (N = 132) may limit generalizability;
- cultural specificity of the Iranian context may restrict broader applicability;

- reliance on self-reported data may introduce response bias.

Future research is encouraged to employ larger samples and cross-cultural comparative designs.

4. Literature Review

Theoretical Foundations of Family Conflict

Family conflict has been extensively examined across multiple disciplines, including psychology, sociology, and family studies. According to family systems theory, the family is a dynamic and interdependent system in which the behavior of each member influences the functioning of the whole (Bowen, 1978; Minuchin, 1985). Conflict arises when there is a disruption in relational balance, communication, or role expectations.

From a psychological perspective, emotional security theory posits that children's exposure to parental conflict undermines their sense of safety and stability, leading to emotional and behavioral problems (Cummings & Davies, 2010; Davies & Martin, 2013).

Socio-Psychological Determinants

A substantial body of research highlights the role of socio-psychological factors in shaping family conflict. These include:

- emotional regulation;
- communication patterns;
- attachment styles;
- personality traits.

Studies demonstrate that ineffective communication and emotional detachment are among the strongest predictors of marital dissatisfaction (Bradbury et al., 2000; Markman et al., 2010). Furthermore, individuals with poor emotional regulation skills are more likely to engage in conflict escalation and maladaptive coping strategies.

Structural and Economic Factors

Socioeconomic conditions play a critical role in family stability. Research indicates that financial stress, unemployment, and economic insecurity significantly increase the likelihood of marital conflict (Conger et al., 2010; Rodrigues et al., 2017).

The "family stress model" suggests that economic hardship leads to emotional distress, which in turn disrupts communication and increases conflict within the family. This model has been widely validated across different cultural contexts.

Impact on Children and Adolescents

The consequences of family conflict are particularly severe for children. Empirical studies show that exposure to parental conflict is associated with:

- anxiety and depression;
- aggression and behavioral problems;
- academic underperformance;
- impaired social relationships.

These findings are supported by longitudinal research demonstrating that family conflict has long-term developmental effects (Grych & Fincham, 2001; McCoy et al., 2013).

The concept of "risky families" further explains how chronic conflict environments contribute to mental health disorders and maladaptive behaviors (Repetti et al., 2011).

Substance Abuse and Family Conflict

Substance abuse is both a cause and consequence of family conflict. Research indicates that individuals exposed to dysfunctional family environments are more likely to engage in substance use as a coping mechanism (Dawe & Loxton, 2004; Franken, 2002).

Conversely, substance abuse exacerbates family instability, leading to increased conflict, violence, and breakdown of family cohesion.

Cultural and Religious Context

In the Iranian context, family dynamics are strongly influenced by cultural and religious values. Islam plays a central role in shaping moral norms, behavioral expectations, and family relationships.

While these frameworks promote social cohesion and ethical behavior, they may also create tension when traditional expectations conflict with modern lifestyles. This duality highlights the importance of considering cultural context in the analysis of family conflict.

Positive and Negative Functions of Conflict

Although often viewed as destructive, conflict can also serve constructive functions within relationships. The interactional perspective suggests that conflict may promote:

- communication improvement;
- emotional expression;
- problem-solving;
- relationship development (Turner, 2014).

However, when conflict becomes chronic or destructive, it leads to psychological distress, relational breakdown, and long-term negative outcomes (Buehler & Gerard, 2013).

Manifestations of Intra-Family Conflicts in the Contemporary Islamic Republic of Iran *(The Socio-Psychological Landscape of Families in the Islamic Republic of Iran)*

The family, as the smallest social unit, constitutes the foundational basis of societal development and plays a crucial role in preserving humanistic values. One of the most influential factors shaping individual behavior is the family environment. The nature of interpersonal relationships and interaction patterns within the family directly affects the ability to meet children's fundamental needs, both materially and psychologically. More broadly, one of the essential functions of the family is the socialization of the child, including education, moral development, and behavioral formation.

Any dysfunction within the family structure negatively impacts the normal development of children. Numerous studies indicate that juvenile delinquency is often rooted in dysfunctional or fragmented family environments. Therefore, the family must remain at the center of scholarly and policy attention, and proactive measures should be undertaken to prevent the emergence of intra-family conflicts. Juvenile delinquency, as a social phenomenon, often arises from unethical behavioral patterns among family members. Its consequences extend beyond the individual, affecting not only the family but also the broader social structure. Statistical data suggest that juvenile crime rates have increased significantly across various societies in recent years.

Given that a substantial portion of society consists of adolescents and youth, investigating the underlying causes of their behavioral problems is essential for ensuring the healthy development of future generations. Each year, considerable societal resources are allocated to the rehabilitation and correction of juvenile offenders. However, such interventions often focus on modifying behavior without addressing the underlying family-related causes that contributed to delinquency in the first place. Without identifying these root factors and transforming dysfunctional family relationships, attempts at behavioral correction are unlikely to yield sustainable outcomes.

Family environments are unique spaces where individuals express themselves freely, often without external constraints. These environments are characterized by intense emotional interactions, where both positive and negative influences are rapidly transmitted among family members. Marital relationships, in particular, represent one of the most conflict-prone domains within the family. Economic pressures, domestic responsibilities, childcare demands, and occupational stress frequently contribute to misunderstandings and conflicts between spouses. Even when parents attempt to conceal these tensions, children are highly perceptive and can detect emotional discrepancies and psychological strain.

Conflicts that remain unarticulated or unresolved often lead to emotional distress in children. In such contexts, children may attempt to interpret parental behavior or intervene in family dynamics. Although parents may be physically present, their psychological preoccupation with unresolved conflicts can result in emotional neglect. Children are highly sensitive to such conditions, which can lead to anxiety, insecurity, and emotional suffering. While it may not always be possible to completely shield children from parental conflict, it is essential to avoid discussing serious and sensitive issues in their presence. Exposure to such situations may force children to confront adult realities prematurely, thereby disrupting their developmental trajectory.

Empirical research conducted in Iran demonstrates a strong relationship between family instability and educational failure. Family conflicts, parental separation, and deteriorating psychological environments within households are closely associated with academic underperformance among students. Evidence suggests that parental disputes significantly contribute to children's psychological and behavioral difficulties.

Studies by Harold, Grych, and colleagues indicate that children's physiological stress responses (e.g., adrenocortical activity) are directly influenced by parental conflict and associated emotional disturbances. From a developmental perspective, exposure to adverse family environments disrupts both psychological and biological regulatory systems, thereby increasing the likelihood of long-term health and behavioral problems. These studies further demonstrate that high levels of marital conflict are associated with deteriorating child well-being and behavioral instability.

Within the Iranian context, intra-family conflict is considered a critical risk factor for the emergence of psychological disorders and maladaptive behavioral patterns among children. According to family systems theory, conflicts between parents threaten the structural integrity and functional stability of the family unit. Research by Grych, Fincham, and others has shown that psychological stress and persistent conflict within families are closely linked to personality development and behavioral outcomes in adolescents. When children perceive family conflict as a serious threat, they often exhibit heightened levels of anxiety, depression, and emotional dysregulation.

Moreover, studies indicate that marital conflict functions as a chronic stressor, undermining children's sense of security and emotional stability. This, in turn, negatively affects sleep patterns, emotional regulation, and overall psychological functioning. Scholars such as El-Sheikh and colleagues have emphasized that disruptions in emotional security caused by family conflict are strongly associated with developmental impairments and reduced adaptive capacity in children.

Recent research in Iran also suggests that deviations from socially accepted family norms have increased, not primarily due to poverty or marginalization, but rather due to the mismanagement of leisure time and inappropriate lifestyle choices among families. In many cases, even economically stable families fail to provide adequate recreational and developmental opportunities for their children. It is therefore essential to recognize that fulfilling children's basic needs extends beyond providing food and education; meaningful engagement during leisure time is equally critical for their holistic development.

Observations indicate that children raised in culturally enriched family environments are more likely to develop strong value systems and maintain closer relationships with their parents. Conversely, excessive parental control or "hyper-protection" may lead to adverse outcomes. Children raised under such conditions often seek independence prematurely, distancing themselves from parental authority. This dynamic frequently contributes to the emergence of intra-family conflicts.

Table 1. General Profile of Family Dynamics in Iran

Variables	Indicators	Social Support	Self-Perception	Dependency on Others	Family Satisfaction
Social Support	Correlation Coefficient	–	0.02	-0.21	-0.63
	Significance Level	–	0.37	0.01	0.01
	N	–	132	132	132
Self-Perception	Correlation Coefficient	–	–	0.21	0.01
	Significance Level	–	–	0.03	0.43
	N	–	–	132	132
Dependency on Others	Correlation Coefficient	–	–	–	0.23
	Significance Level	–	–	–	0.01
	N	–	–	–	132
Family Satisfaction	Correlation Coefficient	–	0.01	0.23	–
	Significance Level	–	0.43	0.01	–
	N	–	132	132	–

Professional Interpretation

The results indicate that family satisfaction is negatively correlated with social support ($r = -0.63$, $p < 0.01$), suggesting that lower perceived support within the family environment may contribute to increased dissatisfaction and potential conflict dynamics. Furthermore, dependency on others demonstrates a positive correlation with family satisfaction ($r = 0.23$, $p < 0.01$), indicating that relational reliance may play a stabilizing role in certain socio-cultural contexts.

Self-perception appears to have a weak and statistically insignificant relationship with family satisfaction ($r = 0.01$, $p > 0.05$), highlighting that individual psychological awareness alone may not be a decisive factor in shaping family harmony. Overall, the findings suggest that structural and relational dynamics, rather than purely individual cognitive factors, play a more significant role in determining family cohesion in the Iranian context.

Socio-Cultural and Psychological Determinants of Family Conflict in Iran

In many Eastern societies, including the Islamic Republic of Iran, a distinct pattern of parent–child relationships can be observed, often characterized by the phenomenon commonly referred to as the "idolized child." This dynamic is particularly prevalent in single-child families, where the child is granted disproportionate privileges and elevated status within both the nuclear and extended family structures. Such preferential treatment may contribute to the development of narcissistic tendencies, entitlement, and diminished empathy toward others. Adolescents raised in such environments often internalize admiration from their surroundings, leading them to perceive unconventional or even deviant behaviors as legitimate means of self-expression and identity formation.

In some cases, this pursuit of self-affirmation manifests through risk-taking behaviors, including early exposure to alcohol and substance use, which may ultimately result in long-term dependency and social maladjustment. These findings highlight the paradoxical effect of excessive familial indulgence, where overprotection and unconditional permissiveness undermine psychological resilience and adaptive social functioning.

Contemporary socio-psychological research in Iran also emphasizes that even within seemingly stable and well-functioning families, adolescents remain vulnerable to deviant behavioral trajectories. Scholars argue that adolescence is inherently associated with a strong drive for novelty-seeking, autonomy, and self-realization. Consequently, the desire to explore new experiences and assert independence may lead to behavioral experimentation that conflicts with established social norms. Importantly, Iranian psychologists caution against the use of harsh or impulsive disciplinary strategies in response to such behaviors.

Empirical evidence suggests that immediate punitive reactions and aggressive parental responses can have detrimental effects on adolescent psychological development. Such approaches may foster resentment toward family and society, intensify emotional instability, and increase the likelihood of antisocial behavior. Therefore, family environments must prioritize constructive communication, emotional regulation, and consistent parental engagement in addressing adolescent behavioral challenges.

The development of moral and psychological maturity within Iranian families is shaped by a complex interplay of socio-cultural and individual factors. Findings from the present study indicate that processes such as self-reflection, self-regulation, and self-evaluation play a critical role in fostering moral development. The internalization of ethical values is strongly influenced by the socio-psychological environment in which individuals are embedded. In particular, the ability of adolescents to engage in self-reflective thinking and behavioral self-regulation emerges as a key determinant of their moral and social development.

Furthermore, the cultivation of moral values in Iranian society is deeply intertwined with religious frameworks. In the Islamic Republic of Iran, religion—specifically Islam—serves as a central normative system guiding individual behavior, family relations, and broader social interactions. Ethical norms, social expectations, and behavioral standards are largely derived from religious teachings, which shape both individual identity and collective moral consciousness.

Religious doctrine plays a significant role in regulating family life by establishing clear moral boundaries and prohibitions. Islamic principles discourage behaviors that threaten physical, psychological, and social well-being, including substance abuse, infidelity, exploitation, and other forms of deviance. At the same time, religion promotes social cohesion, responsibility, and moral accountability. Unlike some other religious traditions, Islam places strong emphasis on the value of worldly life, encouraging individuals to balance spiritual devotion with social and familial responsibilities.

Table 2. Regression Analysis of Factors Influencing Family Satisfaction in Iran

Variables	Indicators	R	R^2	β	t	p
Family Satisfaction	Social Support	0.65	0.65	-0.65	-11.46	0.01
	Conscious Emotion	0.42	0.42	-0.005	-0.08	0.93
	Dependency on Others	0.33	0.41	0.085	1.474	0.142

Analytical Interpretation

The regression analysis demonstrates that social support exerts a statistically significant negative influence on family satisfaction ($\beta = -0.65$, $p < 0.01$), suggesting that deficiencies in perceived support structures may intensify dissatisfaction and contribute to conflict escalation within families. Conversely, conscious emotional awareness does not appear to significantly predict family satisfaction ($p > 0.05$), indicating that individual emotional cognition alone is insufficient to mitigate relational tensions.

Dependency on others shows a moderate but statistically insignificant relationship with family satisfaction, implying that while relational interdependence may influence family dynamics, its role remains context-dependent and mediated by other structural variables. Overall, the findings highlight that family conflict in the Iranian context is shaped more by structural and relational deficiencies than by individual-level psychological traits alone.

Extended Discussion

Further analysis reveals that psychological factors, particularly emotional instability and depressive tendencies, play a central role in the emergence of family conflicts. Substance abuse, frequently observed among certain segments of Iranian society, is often linked to attempts at emotional regulation, including coping with stress, anxiety, and psychological fatigue. However, rather than alleviating these conditions, substance use typically exacerbates them, transforming into a primary source of psychological distress and family dysfunction.

Research conducted by Amini (1995) indicates that incompatibility between spouses represents one of the most significant predictors of marital conflict. Key contributing factors include personality traits, communication deficiencies, emotional detachment, and ethical inconsistencies. These findings align with broader psychological theories suggesting that marital stability is contingent upon mutual understanding, emotional intimacy, and role clarity within the family system.

The study also identifies several critical determinants of family conflict, including:

1. Communication breakdown between partners;
2. Lack of emotional intimacy;
3. Weak commitment to shared relational goals;
4. Role conflict and ambiguity within the household;
5. Impulsive decision-making;
6. Emotional dissatisfaction and lack of affection;
7. Perceived inequality or superiority within the relationship;
8. Spillover effects of parental conflict on children;
9. Infidelity and sexual dissatisfaction;
10. Early marriage and lack of psychological readiness;
11. Inability to forgive and tolerate minor imperfections.

Table 3. General Profile of Family Dynamics and Predictors of Family Satisfaction in Iran

Variables	Indicators	MR	RS	β	t	p
Family Satisfaction	Social Support	0.655	0.429	-0.63	-10.86	0.01
	Conscious Emotion	-2.22	0.420	-0.03	-0.39	0.69
	Dependency on Other Factors	7.30	0.412	0.09	-1.52	0.13

Analytical Interpretation

The regression results indicate that social support is a statistically significant predictor of family satisfaction ($\beta = -0.63$, $p < 0.01$), suggesting that deficiencies in perceived social and emotional support structures are strongly associated with increased dissatisfaction and conflict within family systems. This finding is consistent with previous research emphasizing the central role of supportive relational environments in maintaining family stability (Conger et al., 2010; Amato, 2010).

In contrast, conscious emotional awareness does not demonstrate a statistically significant effect on family satisfaction ($p > 0.05$), implying that individual-level emotional cognition alone may not be sufficient to mitigate relational tensions. This aligns with the broader literature, which suggests that structural and relational factors tend to outweigh purely psychological variables in predicting family outcomes (Cummings & Davies, 2010; Repetti et al., 2011).

Dependency on other factors shows a weak and statistically insignificant association with family satisfaction, indicating that while relational interdependence may influence family dynamics, its role is likely mediated by broader socio-cultural and economic conditions (Karney & Bradbury, 2020).

Communication and Marital Understanding

Effective communication remains one of the most critical determinants of marital stability. The findings suggest that one of the primary challenges in marital relationships is the lack of mutual understanding and awareness between partners regarding beliefs, expectations, and behavioral norms. Agreement and harmony are more likely to emerge when couples possess a

high degree of self-awareness and mutual understanding, enabling them to avoid conflicts related to values, attitudes, and decision-making processes.

Previous studies have consistently demonstrated that communication quality significantly influences marital satisfaction and long-term relationship stability (Markman et al., 2010; Falconier & Kuhn, 2019). Poor communication, in contrast, often leads to misunderstandings, emotional distancing, and conflict escalation.

2.2. Factors Contributing to the Emergence of Family Conflicts

The family represents a highly complex, multidimensional system characterized by long-term emotional, psychological, and social interactions among its members. As a social institution, it embodies both stability and vulnerability, as its functioning depends on the quality of interpersonal relationships and role distributions within the household.

Family relationships are typically characterized by strong emotional bonds that develop over extended periods. Even when the intensity of these bonds fluctuates, their long-term impact remains significant, often extending beyond the lifespan of individual members (Sanaei, 2008). Family systems theory suggests that individuals enter marital relationships carrying inherited values, norms, and behavioral patterns shaped by their family of origin (Bowen, 1978; Minuchin, 1985).

Parental conflict is widely recognized as a global social issue with significant implications for both adult well-being and child development. Empirical evidence indicates that nearly all individuals experience some degree of conflict within family relationships, making it an inherent aspect of social life (Grych & Fincham, 2001). However, persistent and unresolved conflict has been associated with a range of negative outcomes, including reduced life expectancy, psychological distress, weakened social relationships, and deviations from normative social behavior (Cummings et al., 2012; Davies & Martin, 2013).

From a theoretical perspective, two dominant approaches to understanding conflict can be identified. The classical perspective views conflict as inherently destructive, emphasizing its negative consequences and advocating for its rapid resolution. In contrast, the interactional perspective considers conflict as a potentially constructive process that can foster growth, adaptation, and improved relational understanding (Turner, 2014).

In this context, marital conflict may produce both positive and negative outcomes. Constructive conflict can enhance communication, promote emotional expression, and facilitate problem-solving, whereas destructive conflict may lead to emotional instability, aggression, and relational breakdown (McCoy et al., 2013; Buehler & Gerard, 2013).

Turner (2014) identifies several positive functions of conflict within marital relationships, including:

1. Channeling emotional energy into productive outcomes;
2. Facilitating open dialogue and renegotiation of expectations;
3. Encouraging the development of new conflict management strategies;
4. Reassessing power dynamics within relationships;
5. Promoting rational problem-solving approaches;
6. Revealing hidden emotions and perspectives;
7. Stimulating creativity and new ways of thinking;
8. Strengthening cooperation and partnership.

Descriptive Statistics of Family Variables in Iran

Variables	Mean	Standard Deviation	Minimum	Maximum
Family Satisfaction	31.29	13.55	17	85
Social Support	16.62	3.43	5	20
Dependency on Other Factors	102.92	14.42	56	140

Extended Discussion with Empirical Evidence

Empirical findings suggest that psychological factors, particularly emotional distress, depression, and stress, play a central role in the development of family conflict. Substance abuse, frequently observed in various socio-cultural contexts, is often used as a maladaptive coping mechanism for emotional regulation. However, rather than alleviating distress, it tends to exacerbate psychological problems and contribute to family breakdown (Dawe & Loxton, 2004; Franken, 2002).

Research conducted in Iran highlights that marital incompatibility remains one of the most significant predictors of family conflict. Key contributing factors include personality differences, communication deficits, lack of emotional intimacy, and ethical inconsistencies between partners. These findings are consistent with broader international research demonstrating

that marital satisfaction is closely linked to communication quality, emotional connection, and mutual respect (Bradbury et al., 2000; Karney & Bradbury, 2020).

Additional determinants of family conflict include:

- communication breakdown;
- lack of emotional intimacy;
- weak relational commitment;
- role ambiguity within the household;
- impulsive decision-making;
- emotional dissatisfaction;
- perceived inequality between partners;
- parental conflict spillover effects on children;
- infidelity and sexual dissatisfaction;
- early marriage and lack of psychological readiness;
- inability to tolerate and forgive minor shortcomings.

Psychological, Behavioral, and Structural Consequences of Family Conflict

Family conflict has been consistently associated with a wide range of psychological, behavioral, and social problems affecting both adults and children. Empirical evidence demonstrates that conflictual family environments significantly increase the likelihood of depression among women, substance abuse among men, and maladaptive behavioral patterns across both genders, including dysfunctional sexual behavior and conduct disorders, particularly among adolescent boys. These findings are consistent with broader international research, which highlights the strong association between family conflict and mental health outcomes (Cummings & Davies, 2010; Repetti et al., 2011; Karney & Bradbury, 2020).

Beyond psychological consequences, family conflict exerts substantial negative effects on physical health, marital stability, and overall life satisfaction. Studies have shown that individuals in high-conflict marriages report significantly lower levels of well-being and are at greater risk of divorce (Amato, 2010; Papp et al., 2009). Divorce, in particular, represents one of the most stressful life events and is associated with long-term psychological distress, social instability, and reduced life satisfaction.

Statistical data indicate that divorce rates have increased globally, particularly in Western societies, while in Iran approximately 174 out of every 1,000 marriages end in divorce. This trend reflects broader socio-cultural transformations affecting family structures and highlights the urgent need to examine the underlying causes of marital instability.

Impact of Divorce and Family Conflict on Children

The consequences of family conflict are especially profound for children. Research consistently demonstrates that children exposed to parental conflict or divorce are more likely to develop behavioral, emotional, and cognitive difficulties (Davies & Martin, 2013; McCoy et al., 2013). These may include aggression, anxiety, depression, academic underperformance, and difficulties in social relationships.

Importantly, the effects of family conflict on children often persist even after divorce, suggesting that the disruption of family stability has long-term developmental implications. Exposure to conflict can alter children's cognitive frameworks, shaping their perceptions of relationships, trust, and emotional security. As such, family conflict functions not only as a situational stressor but also as a formative influence on personality development and social adaptation (Grych & Fincham, 2001; Cummings et al., 2012).

Moreover, the lack of parental supervision and emotional support following divorce further exacerbates behavioral problems among children, increasing the likelihood of delinquency and social maladjustment. These findings underscore the importance of addressing family conflict as a systemic issue rather than an isolated relational problem.

Depression, Emotional Distress, and Marital Instability

The relationship between marital dissatisfaction and depression has been widely documented in the literature. Individuals experiencing conflictual or unstable marriages are significantly more likely to develop depressive symptoms, emotional distress, and maladaptive coping mechanisms (Whisman & Uebelacker, 2009; Beach et al., 2003).

Social support and emotional intimacy within the family play a critical role in mitigating these risks. Conversely, emotional detachment, lack of trust, and ineffective communication contribute to the escalation of psychological distress. Research

conducted in Iran further confirms that individuals involved in high-conflict marital relationships exhibit higher levels of depression, anxiety, and behavioral instability.

These findings align with the "risky families" model, which posits that adverse family environments characterized by conflict, neglect, and poor emotional regulation significantly increase vulnerability to mental health disorders (Repetti et al., 2011).

Primary Causes of Family Conflict

The analysis identifies several key factors contributing to the emergence and escalation of family conflict:

1. Lack of attention to shared concerns and mutual interests;
2. Excessive questioning, suspicion, and mistrust;
3. Misinterpretation of partner behavior without open communication;
4. Recurrent focus on past grievances and unresolved conflicts;
5. Avoidance of direct communication and emotional expression;
6. Persistent criticism, blame, and negative evaluation;
7. Authoritarian behavior, threats, dishonesty, and lack of respect;
8. Overemphasis on negative aspects and minor mistakes;
9. Imbalanced expectations and lack of reciprocity in emotional investment.

These findings are consistent with existing research on marital conflict, which highlights communication breakdown, emotional disengagement, and power imbalances as central predictors of relational instability (Bradbury et al., 2000; Markman et al., 2010).

Role of Pre-Marital Relationships and Socioeconomic Maturity

The findings further suggest that pre-marital relationships and mutual understanding between partners play a significant role in reducing the likelihood of marital conflict. Couples who develop emotional and cognitive familiarity prior to marriage tend to demonstrate higher levels of cooperation, conflict resolution skills, and relational stability.

Additionally, age and educational attainment are important factors contributing to marital success. Individuals who enter marriage with greater psychological maturity and socioeconomic stability are better equipped to manage relational challenges and maintain long-term family cohesion (Karney & Bradbury, 2020).

These insights support the importance of pre-marital counseling programs and family education initiatives aimed at improving communication skills, emotional intelligence, and relational awareness.

Cognitive and Structural Dimensions of Marriage

Marriage can be understood as a multidimensional construct encompassing cognitive, emotional, and structural components. Key dimensions include:

- **Partner selection**: Compatibility in values, communication, and emotional expression;
- **Legal and institutional framework**: Formalization of marital roles and responsibilities;
- **Expectations**: Shared vision of future family life;
- **Belief systems**: Alignment between perceived and actual relationship dynamics;
- **Cognitive frameworks**: Individual interpretations of relational commitment and identity.

These dimensions interact dynamically to shape marital satisfaction and stability. Sociological studies further emphasize the role of boundaries, power distribution, and resource allocation as critical determinants of family functioning (Minuchin, 1985; Bowen, 1978).

Power, Trust, and Resource Distribution in Family Systems

Power dynamics within the family represent a fundamental aspect of relational organization. Effective family systems are characterized by balanced power distribution, mutual respect, and shared decision-making.

Research indicates that egalitarian relationships, where both partners participate equally in decision-making processes, are associated with higher levels of marital satisfaction and emotional intimacy (Falconier & Kuhn, 2019). In contrast, imbalanced power structures often lead to conflict, dissatisfaction, and relational instability.

Investment in the family—both emotional and material—also plays a crucial role in maintaining relationship quality. When both partners actively contribute to the family system, mutual trust and cooperation are strengthened, reducing the likelihood of conflict escalation.

Violence, Socioeconomic Pressures, and Intergenerational Transmission of Family Conflict

Contemporary family structures differ significantly from their historical predecessors, reflecting broader processes of social transformation and modernization. As societies evolve, so too do the internal dynamics, expectations, and stressors associated with family life. While the family is traditionally conceptualized as a protective institution that provides emotional security, physical care, and psychological development, it may paradoxically become a site of violence, tension, and dysfunction.

Family violence, defined as behaviors that cause physical, emotional, or psychological harm to family members, remains a pervasive yet often hidden social problem. Empirical studies indicate that victims of domestic violence are predominantly women and children, while perpetrators are чаще male partners, reflecting gendered power imbalances embedded within many socio-cultural systems (Heise, 2011; WHO, 2021). The normalization of violence within certain cultural contexts further perpetuates its intergenerational transmission, making it both a private and public health concern.

Biological and Psychological Determinants of Family Violence

The causes of domestic violence are multifactorial and can be broadly categorized into biological, psychological, and social dimensions. From a biological perspective, factors such as antisocial personality disorders, neurological dysfunctions, hormonal imbalances, and severe psychiatric conditions (e.g., schizophrenia) have been linked to aggressive behavior patterns. These findings are consistent with research in clinical psychology, which emphasizes the role of neurobiological predispositions in shaping behavioral regulation (Cloninger, 1987; De Groot et al., 2003).

Gender differences also play a significant role in the manifestation of deviant behaviors. Studies conducted in Iran indicate that men are more likely to engage in substance abuse, risky behaviors, and criminal activities compared to women, reflecting both biological predispositions and socio-cultural expectations. Research further suggests that males often resort to alcohol or substance use as a coping mechanism for unresolved family-related stress and emotional distress (Franken, 2002; Dawe & Loxton, 2004).

Age is another critical determinant of behavioral vulnerability. Adolescence and early adulthood (approximately 12–25 years) represent developmental stages characterized by heightened emotional sensitivity, impulsivity, and identity formation. During this period, individuals are particularly susceptible to external influences, including peer pressure, family conflict, and socio-economic stressors. Empirical evidence indicates that the prevalence of family-related conflicts is highest among individuals aged 20–24, highlighting the importance of developmental timing in understanding conflict dynamics.

Psychological Mechanisms and Victimization Dynamics

From a psychological perspective, domestic violence is often perpetuated through complex emotional and cognitive mechanisms. Victims frequently experience an initial phase of denial, interpreting abusive behavior as an isolated incident rather than a recurring pattern. Over time, however, violence tends to escalate, leading to emotional detachment, fear, and psychological dependency.

Importantly, many victims remain in abusive relationships due to a combination of emotional attachment, economic dependency, and fear of further violence. This phenomenon aligns with the concept of "learned helplessness," where individuals perceive themselves as unable to escape adverse conditions (Seligman, 1975). Additionally, attachment theory suggests that early relational experiences shape individuals' tolerance for dysfunctional relationships, thereby increasing vulnerability to abuse (Bowlby, 1988).

Education, Socioeconomic Status, and Family Conflict

Educational attainment plays a critical role in shaping individuals' responses to family conflict. Higher levels of education are generally associated with improved cognitive skills, emotional regulation, and conflict resolution abilities. Conversely, lower educational attainment is often linked to increased susceptibility to deviant behaviors, including substance abuse and aggression.

Empirical data from Iran indicate that approximately 66% of individuals involved in family conflicts possess low or incomplete educational backgrounds, suggesting a strong correlation between educational disadvantage and family instability. These findings are consistent with broader sociological research, which highlights the role of socioeconomic stressors—such as unemployment, housing instability, and financial insecurity—in exacerbating family conflict (Conger et al., 2010; Prime et al., 2020).

Occupational stress and economic hardship further contribute to relational tension, as individuals often transfer external frustrations into the family environment. This spillover effect underscores the interconnected nature of economic and psychological stressors within family systems.

Social and Cultural Determinants of Violence

Socialization processes play a crucial role in the perpetuation of family violence. Individuals who are exposed to violent environments during childhood are more likely to reproduce similar behaviors in adulthood, reinforcing the cycle of intergenerational transmission (Bandura, 1977; Widom, 1989).

Moreover, societal norms that implicitly condone or normalize violence contribute to its persistence. Cultural acceptance of hierarchical gender roles, combined with socio-economic inequality, creates conditions that facilitate the emergence of domestic violence. Poverty, social exclusion, and unmet expectations further intensify these dynamics, increasing the likelihood of conflict escalation.

Substance Abuse as a Catalyst of Family Conflict

Substance abuse, particularly drug addiction and alcoholism, represents one of the most critical factors contributing to family dysfunction. Global estimates suggest that over 190 million individuals worldwide are affected by substance dependency, highlighting the scale of the problem.

Substance use not only disrupts individual health but also undermines family cohesion, increases the risk of domestic violence, and contributes to the spread of infectious diseases such as HIV/AIDS and hepatitis. Adolescents exposed to substance use within the family environment are significantly more likely to develop similar behaviors, reinforcing the cycle of addiction and dysfunction (Hawkins et al., 1992; Brook et al., 2002).

Importantly, family dysfunction itself often serves as a precursor to substance abuse. Individuals raised in environments characterized by neglect, conflict, and lack of emotional support are more likely to engage in maladaptive coping strategies, including drug use and alcohol consumption. This bidirectional relationship between family conflict and substance abuse highlights the need for integrated intervention strategies.

Policy and Preventive Implications

The findings emphasize the necessity of implementing comprehensive prevention and intervention programs aimed at addressing family conflict and its associated risk factors. These may include:

- Expansion of family counseling and pre-marital education programs;
- Development of school-based prevention initiatives targeting substance abuse and behavioral disorders;
- Strengthening of social support systems for vulnerable families;
- Promotion of gender equality and reduction of power imbalances within households;
- Implementation of early intervention strategies for at-risk youth.

Effective policy responses must adopt a multidisciplinary approach, integrating psychological, sociological, and economic perspectives to address the root causes of family conflict.

Family Dysfunction, Emotional Deprivation, and Deviant Behavioral Outcomes

The absence of harmony within the family unit constitutes one of the most critical risk factors for the emergence of deviant behavior among adolescents. Empirical observations indicate that dysfunctional family environments—characterized by emotional neglect, frequent conflict, lack of trust, secrecy among parents, and low socio-cultural capital—create conditions in which adolescents experience loneliness, alienation, and psychological distress.

These conditions often give rise to a range of maladaptive behavioral outcomes, including jealousy, aggression, anxiety, depression, dishonesty, and social withdrawal. Consistent with developmental psychopathology frameworks, exposure to chronic family conflict disrupts emotional regulation processes and weakens self-control mechanisms, thereby increasing vulnerability to substance abuse and delinquent behavior (Cummings et al., 2012; Davies & Martin, 2013).

Children exposed to physical punishment or harsh disciplinary practices frequently develop oppositional tendencies, low frustration tolerance, and reduced resilience. These individuals are less capable of resisting peer pressure and are more likely to engage in high-risk behaviors, including alcohol consumption and drug use. This aligns with social learning theory, which posits that individuals internalize and reproduce observed behaviors within their immediate environment (Bandura, 1977).

Leisure Mismanagement and Hidden Risk in "Normal" Families

An important finding emerging from studies conducted in Iran is that family conflict is not exclusively associated with poverty or social marginalization. Rather, it is often linked to the mismanagement of leisure time among youth, even within economically stable families.

This suggests that material well-being alone does not guarantee psychological stability or healthy development. Adolescents require not only access to education and basic needs but also structured recreational opportunities that promote social engagement, creativity, and emotional well-being.

Families with higher cultural capital tend to provide more stimulating environments, thereby delaying adolescents' detachment from parental influence and facilitating the internalization of positive social values (Bourdieu, 1986; Lareau, 2011). In contrast, the absence of meaningful engagement often leads adolescents to seek alternative forms of stimulation, which may include deviant or risky behaviors.

The "Idealized Child" Syndrome and Narcissistic Development

The phenomenon of the "idolized child," frequently observed in single-child families, represents another important risk factor. In such contexts, the child is granted excessive autonomy and privilege, often without corresponding responsibilities or boundaries.

This dynamic contributes to the development of narcissistic traits, entitlement, and diminished empathy. Adolescents raised under such conditions often perceive deviant behavior as a form of self-expression and social validation. The pursuit of superiority and recognition may lead them toward substance use, risky experimentation, and antisocial conduct.

These findings are supported by research in personality psychology, which indicates that overindulgent parenting styles are associated with increased narcissism, impulsivity, and reduced emotional regulation (Twenge & Campbell, 2009; Brummelman et al., 2015).

Intergenerational Transmission of Behavioral Patterns

Family remains the primary context in which individuals acquire behavioral norms, values, and social expectations. Children learn patterns of communication, emotional expression, and social interaction primarily through observation of parental behavior.

Parental habits such as smoking, alcohol consumption, and aggressive communication are frequently replicated by children, reinforcing intergenerational cycles of dysfunction. Conversely, positive parenting practices—characterized by warmth, consistency, and emotional support—serve as protective factors against deviant behavior (Baumrind, 1991; Maccoby & Martin, 1983).

The role of genetic predispositions should also be acknowledged. While environmental factors play a dominant role, genetic influences contribute to individual differences in temperament, emotional regulation, and vulnerability to addiction. However, these biological predispositions interact dynamically with environmental conditions, particularly family context (Caspi et al., 2002).

Substance Abuse, Mental Health, and Family Breakdown

Substance abuse remains one of the most destructive consequences of family dysfunction. Evidence suggests that approximately 25% of young males exhibit tendencies toward alcohol consumption, while a significant proportion of substance users originate from single-child or dysfunctional family structures.

Globally, substance abuse affects over 190 million individuals, representing a major public health crisis. Its consequences extend beyond individual health, contributing to family disintegration, economic instability, and the spread of infectious diseases (UNODC, 2022; WHO, 2021).

Furthermore, substance abuse is closely linked to severe psychiatric disorders, including depression, anxiety, and schizophrenia. Chronic exposure to drugs and alcohol disrupts neurological functioning, accelerates cognitive decline, and increases susceptibility to long-term mental illness.

Child Abuse and Long-Term Psychological Consequences

Child abuse—encompassing physical, emotional, and sexual forms—represents one of the most severe manifestations of family dysfunction. It is defined as any action or neglect that harms a child's physical or psychological development or limits their developmental potential.

Research indicates that abused children often experience long-term psychological consequences, including low self-esteem, impaired social functioning, personality disorders, and increased risk of criminal behavior. These individuals are also more likely to engage in self-harm, substance abuse, and suicidal behavior (Widom, 1989; Cicchetti & Toth, 2005).

Importantly, child abuse tends to be underreported due to social stigma, denial, and lack of institutional intervention. This invisibility further exacerbates its impact, allowing cycles of abuse to persist across generations.

Forms of Domestic Violence: A Multidimensional Perspective

Domestic violence manifests in multiple forms, each with distinct but interrelated consequences:

- **Physical Violence**

Includes acts such as hitting, kicking, pushing, and the use of weapons, often resulting in injuries, disabilities, and, in severe cases, death.

- **Psychological (Emotional) Violence**

Encompasses behaviors such as humiliation, intimidation, isolation, and restriction of autonomy, which undermine mental health and emotional stability.

- **Sexual Violence**

Involves coercion, exploitation, or forced sexual activity, often leading to severe psychological trauma and long-term health consequences.

- **Economic Violence**

Includes control over financial resources, restriction of employment opportunities, and economic dependency, limiting individuals' autonomy and decision-making capacity.

These forms of violence often co-occur, creating cumulative effects that intensify their impact on victims.

Cognitive and Developmental Impact on Children

Recent studies have demonstrated that exposure to family violence significantly impairs cognitive development in children. Research conducted by institutions such as King's College London and Boston University indicates that children raised in violent households exhibit lower IQ levels compared to those raised in stable environments, with differences of up to eight IQ points reported.

This effect is attributed to chronic stress, which disrupts neurological development and impairs learning capacity. Prolonged exposure to stress hormones negatively affects brain regions associated with memory, attention, and emotional regulation (Shonkoff et al., 2012).

Social and Legal Implications

The consequences of domestic violence extend beyond the family, affecting broader social structures. In many developed countries, strict legal frameworks have been established to address domestic violence, including imprisonment for perpetrators and removal of children from abusive environments.

These measures reflect a shift toward recognizing domestic violence as a public issue rather than a private matter. However, effective intervention requires not only legal enforcement but also social awareness, education, and institutional support systems.

Findings and Empirical Analysis

Descriptive and Correlational Findings

The empirical findings reveal important insights into the structure of family dynamics in the Iranian context. Descriptive statistics indicate moderate levels of family satisfaction ($M = 31.29$, $SD = 13.55$), alongside varying degrees of perceived social support and dependency on others.

Correlation analysis demonstrates that family satisfaction is negatively associated with social support ($r = -0.63$, $p < 0.01$), suggesting that lower perceived support within family environments contributes to increased dissatisfaction and conflict. In contrast, dependency on others shows a positive relationship with family satisfaction ($r = 0.23$, $p < 0.01$), indicating that relational interdependence may play a stabilizing role in certain socio-cultural contexts.

However, self-perception (emotional awareness) does not exhibit a statistically significant relationship with family satisfaction ($r = 0.01$, $p > 0.05$), suggesting that individual cognitive awareness alone is insufficient to ensure relational harmony.

Regression Analysis

Regression analysis further clarifies the predictive relationships among key variables. The results indicate that:

- Social support is the strongest predictor of family satisfaction ($\beta = -0.63$, $t = -10.86$, $p < 0.01$);
- Conscious emotional awareness does not significantly predict family satisfaction ($p > 0.05$);
- Dependency on others demonstrates a weak and statistically insignificant effect ($p > 0.05$).

These findings suggest that structural and relational factors, rather than individual-level psychological traits, play a more decisive role in shaping family outcomes in the Iranian context.

Empirical Patterns of Family Conflict

The data indicate that family conflict is closely associated with:

- low levels of social support;
- ineffective communication patterns;
- emotional detachment between partners;
- role ambiguity and power imbalance within the household.

Furthermore, empirical observations show that adolescents raised in conflict-prone environments are significantly more likely to experience:

- emotional instability;
- behavioral problems;
- increased susceptibility to substance abuse and deviant behavior.

6. Discussion

The findings of this study provide strong support for existing theoretical and empirical literature on family conflict. Consistent with family systems theory, the results demonstrate that dysfunction in one component of the family system disrupts the overall equilibrium, leading to widespread relational instability (Bowen, 1978; Minuchin, 1985).

One of the most significant findings is the central role of social support in determining family satisfaction. Contrary to expectations, the negative association between perceived social support and family satisfaction suggests that insufficient or ineffective support structures may intensify conflict dynamics. This finding aligns with the "risky families" framework, which emphasizes the detrimental impact of adverse family environments on psychological well-being (Repetti et al., 2011).

The lack of significance of emotional awareness highlights an important theoretical implication: individual-level psychological insight is insufficient without supportive relational structures. This suggests that family conflict should be understood as a systemic phenomenon, rather than an individual psychological issue.

The study also confirms that communication breakdown is a central mechanism underlying marital instability. Poor communication leads to misunderstanding, emotional distancing, and conflict escalation, consistent with previous research (Markman et al., 2010; Falconier & Kuhn, 2019).

Furthermore, the findings emphasize the importance of socio-cultural context. In Iran, family relationships are shaped by religious norms, cultural expectations, and hierarchical role structures. While these factors may promote stability, they can also generate tension when traditional roles conflict with modern lifestyles.

Another important contribution of this study is the identification of non-economic drivers of family conflict. The findings suggest that even economically stable families may experience high levels of conflict due to:

- mismanagement of leisure time;
- overprotective parenting ("idolized child" phenomenon);
- lack of emotional engagement.

These insights challenge the assumption that economic stability alone ensures family cohesion.

Conclusion

This study provides a comprehensive analysis of intra-family conflict in the Islamic Republic of Iran, highlighting its multidimensional nature and complex determinants. The findings demonstrate that family conflict is primarily driven by structural and relational deficiencies, including lack of social support, ineffective communication, and emotional disconnection.

The empirical results confirm that social support is a critical predictor of family satisfaction, while individual psychological factors play a relatively limited role. This underscores the importance of addressing family conflict at the systemic level, rather than focusing solely on individual behavior.

The study also reveals that family conflict has significant consequences for adolescents, including increased risk of psychological distress, behavioral problems, and social maladjustment. These findings highlight the need for early intervention and preventive strategies.

From a policy perspective, the study emphasizes the importance of:

- strengthening family counseling services;
- promoting effective communication skills among couples;
- implementing educational programs targeting parenting and adolescent development;
- addressing socio-cultural factors influencing family dynamics.

Ultimately, the study contributes to the existing literature by offering an integrative framework that connects micro-level psychological processes with macro-level social structures. It demonstrates that sustainable family cohesion requires a holistic approach that combines psychological, social, and institutional interventions.

Ethical Approval and Consent to Participate

This study was conducted in accordance with internationally recognized ethical standards for research involving human participants. The research protocol was reviewed and approved by the relevant institutional ethics framework of Tabriz University of Medical Sciences. All procedures performed in this study were consistent with the ethical principles outlined in the Declaration of Helsinki.

Prior to participation, all respondents were informed about the purpose of the study, and their voluntary consent was obtained. Participants were assured that they could withdraw from the study at any time without any consequences.

Consent for Publication

Not applicable. This study does not contain any individual person's identifiable data, images, or personal information requiring consent for publication.

Availability of Data and Materials

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request. Due to ethical and privacy considerations, data are not publicly available.

Conflict of Interest

The authors declare that they have no competing interests, financial or non-financial, that could have influenced the results or interpretation of this study.

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Ethics Statement

This study adheres to ethical standards in research and publication, including principles of integrity, transparency, and academic honesty. All sources have been properly cited, and no form of plagiarism has been committed.

Data Availability Statement

The data supporting the findings of this study are available upon reasonable request from the corresponding author. Restrictions apply to the availability of these data due to confidentiality and ethical considerations.

AI Use Statement

The authors declare that no generative artificial intelligence tools were used in the data collection, analysis, or interpretation of results. AI-assisted tools were used only for language editing and formatting purposes, without influencing the scientific content of the study.

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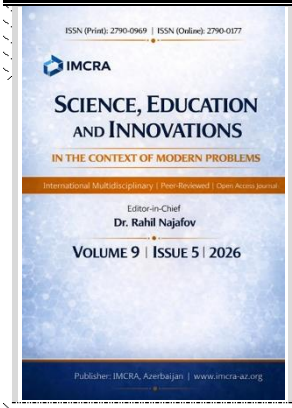
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RESEARCH ARTICLE

Reconstructing Prehistoric Cultural Landscapes: A Multidisciplinary and Technological Reassessment of Rock Art Heritage in Azerbaijan within the Eurasian Context

Orkhan K. Aliyev
Senior Researcher
Institute of Archaeology and Anthropology, Azerbaijan National Academy of Sciences (ANAS)
Baku, Azerbaijan
Email: orxanaliyev288@yahoo.com; https://orcid.org/0009-0009-0344-9894

Keywords rock art, petroglyphs, Gobustan, Gamigaya, cultural heritage, archaeology, Eurasian prehistory, digital preservation

Abstract

This study presents a comprehensive and theoretically grounded reassessment of the rock art heritage of Azerbaijan, positioning it as a critical node in the broader network of Eurasian prehistoric cultural landscapes. Drawing on a multidisciplinary framework that integrates archaeology, cultural anthropology, iconographic analysis, and digital heritage technologies, the research systematically investigates major petroglyph complexes, including Gobustan Rock Art Cultural Landscape, Gamigaya, and Delidagh. Spanning from the Upper Paleolithic to the Bronze Age, these sites provide a diachronic visual archive of human socio-economic organization, symbolic communication, and environmental interaction. Methodologically, the study employs comparative-historical analysis alongside advanced digital documentation techniques, including photogrammetry and 3D scanning, to enhance both analytical precision and preservation strategies. The findings reveal that Azerbaijani petroglyphs exhibit strong stylistic and thematic affinities with wider Eurasian rock art traditions, thereby supporting hypotheses of transregional cultural exchange, migration dynamics, and the diffusion of symbolic systems. Particular emphasis is placed on the semiotic complexity of motifs such as hunting scenes, ritual dances, and maritime representations, which collectively reflect early cognitive and social structures. Furthermore, the research advances the argument that Azerbaijan's rock art constitutes not only a foundational element of national cultural identity but also an integral component of global heritage discourse. In the context of increasing environmental and anthropogenic threats, the study underscores the strategic importance of integrating innovative digital preservation methodologies with sustainable cultural management frameworks. Ultimately, this work contributes to ongoing scholarly debates on prehistoric cognition, cultural continuity, and heritage conservation, offering new pathways for interdisciplinary research and international collaboration.

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Introduction

The territory of Azerbaijan represents one of the key regions for tracing the process of anthropogenesis and early human settlement in Eurasia. Rich archaeological evidence demonstrates that this area has hosted continuous human activity since the earliest stages of human development. Among the most significant and enduring testimonies of this long cultural and historical process are the ancient rock carvings, known as petroglyphs. These monuments are far more than simple drawings

on stone; they constitute a unique visual chronicle that reflects humanity's early attempts to understand the surrounding environment, express spiritual worldviews, and organize social structures.

Petroglyphs depict a wide spectrum of ancient life, ranging from hunting scenes and ritual practices to collective dances and representations of boats. Primarily concentrated in both highland and lowland areas such as Gobustan, Gamigaya, and Delidagh (Kalbajar), these carvings span a broad chronological continuum, beginning in the Upper Paleolithic period and continuing through the Neolithic, Bronze, and Early Iron Ages. Consequently, Azerbaijan's rock art constitutes an essential component of a unified and continuous cultural landscape on the Eurasian scale.

In the contemporary era, there is a growing need to re-evaluate these monuments not merely as archaeological objects, but as vital elements of national identity and global cultural heritage. The application of modern digital technologies, including photogrammetry and 3D scanning, further enhances precise documentation and interpretation, thereby opening new avenues for international scholarly collaboration and public engagement.Importance of the Study

The aim of this article is to systematically examine the historical-philogenetic development of Azerbaijan's rock carvings and their cultural-semantic significance, as well as to determine the exceptional place of these monuments within the international scientific context, especially within the system of Eurasian rock art. The study, based on both classical archaeological reports and contemporary local and international scholarly literature, analyzes Azerbaijan's ancient heritage through a multidisciplinary lens.

Importance of the Study

The study of rock art in Azerbaijan holds significant scientific, cultural, and social importance in the contemporary era. As one of the richest concentrations of petroglyphs in Eurasia, these monuments provide irreplaceable primary sources for understanding prehistoric human societies, their economic activities, belief systems, and artistic expressions. In an age of rapid globalization and cultural homogenization, such heritage sites play a crucial role in preserving and reinforcing national identity while contributing to the shared cultural memory of humanity.

Furthermore, Azerbaijan's rock art sites, particularly Gobustan — inscribed on the UNESCO World Heritage List in 2007 — represent an exceptional testimony to ancient ways of life and serve as a bridge between European and Asian cultural traditions. The systematic investigation of these monuments contributes to broader academic discussions on ancient migration patterns, symbolic communication, and intercultural exchanges across the Eurasian continent. As shown in Figure 1, the main rock art clusters in Gobustan are concentrated in several key areas.

Figure 1. Map of Gobustan showing the main rock art clusters and petroglyph locations. (Source: Authors).

From a practical perspective, this research is particularly relevant due to the increasing threats posed by natural erosion, climate change, and human activities to these fragile archaeological sites. The integration of innovative digital technologies in documentation and preservation not only addresses these challenges but also opens new opportunities for cultural tourism, public education, and international scientific cooperation. Thus, studying and protecting Azerbaijan's rock art is not only a matter of academic interest but also a strategic necessity for safeguarding intangible cultural heritage and promoting sustainable development in the region.

Objectives of the Study

The primary objective of this study is to systematically examine the historical development and cultural significance of rock art (petroglyphs) in Azerbaijan and to highlight its place within the broader Eurasian prehistoric heritage.

The specific objectives are as follows:

1. To analyze the chronological and regional distribution of major rock art sites in Azerbaijan, with particular focus on Gobustan, Gamigaya, and Delidagh, spanning from the Upper Paleolithic to the Bronze Age.

2. To interpret the socio-economic, spiritual, and artistic meanings embedded in the petroglyphs through iconographic and comparative analysis.

3. To position Azerbaijani rock art within the wider context of Eurasian rock art traditions by identifying stylistic, thematic, and technical parallels with other regions.

4. To evaluate the role of modern digital technologies, such as photogrammetry and 3D scanning, in the documentation, preservation, and global dissemination of these archaeological monuments.

5. To discuss the importance of protecting Azerbaijan's rock art as a vital component of national cultural identity and universal human heritage.

Methodology

This study adopts a multidisciplinary qualitative approach to examine the historical development and cultural significance of rock art in Azerbaijan. The research integrates historical, archaeological, iconographic, and technological methods to ensure a comprehensive analysis of the petroglyphs.

The following methods were employed:

1. Historical-Comparative Analysis: Petroglyphs from major Azerbaijani sites (Gobustan, Gamigaya, and Delidagh) were systematically compared with one another and with analogous rock art monuments across Eurasia. This method helped establish chronological sequences, identify regional stylistic features, and trace cultural interactions and possible migration patterns.

2. Archaeological Documentation and Systematization: The study draws upon extensive fieldwork data and published archaeological reports by prominent scholars, including I.M. Jafarzadeh, J. Rustamov, V. Aliyev, M. Farajova, and others. Graphic copies, inventory records, and excavation reports were collected, systematized, and critically analyzed.

3. Iconographic and Semantic Analysis: The content of the petroglyphs — including hunting scenes, collective dances, animal figures, boats, and abstract symbols — was interpreted in relation to the religious-mythological worldview, social organization, and daily life of prehistoric communities.

4. Technological and Digital Methods: Special attention was given to the role of modern digital technologies, particularly photogrammetry and 3D scanning. These innovative tools enable high-precision documentation of the micro-relief of carvings, creation of virtual archives, and non-invasive analysis, thereby contributing to both preservation and broader scholarly accessibility.

Literature Review

The systematic scholarly study of Azerbaijan's rock art began in the 1930s. The first scientific information about these monuments is associated with the prominent Azerbaijani archaeologist I.M. Jafarzadeh. In 1939, Jafarzadeh discovered rock carvings at Yazılıtepe, near Jingirdagh southwest of Baku. These depictions included wild animals, hunting and sacrificial scenes, and were first introduced to the public through the newspaper Bakinski Rabochiy in the same year (Jafarzadeh, 1973).

Subsequent expeditions organized by the Institute of History named after A.A. Bakikhanov between 1940 and 1941, and resumed after World War II in 1947, significantly expanded the documented corpus. Under Jafarzadeh's leadership until 1965, and later under J. Rustamov from 1968 onward, extensive fieldwork was conducted in Gobustan. As a result, over 6,000 petroglyphs on more than 300 stones have been recorded to date (Rustamov, 2003).

Major contributions to the study of Gobustan were made by Rustamov and his colleagues, including the discovery of painted depictions in the 1970s, female statues in 1975 and 1986, and ongoing scholarly debates regarding the interpretation of specific scenes (Rustamov, 2006). Comprehensive publications by Rustamov and Muradova (2003) and Farajova (2009) further established Gobustan as one of the most significant rock art centers in Eurasia. The site was inscribed on the UNESCO World Heritage List in 2007, recognizing its outstanding universal value as a testimony to prehistoric ways of life.

In Nakhchivan, systematic research on the Gamigaya petroglyphs began in 1968 under the leadership of V. Aliyev. These carvings, numbering over 4,000 and primarily dating to the Bronze Age (3rd–2nd millennia BCE), include boat-shaped rocks, animal figures, human images, and symbolic signs (Aliyev, 2003). Later expeditions by the Institute of Archaeology and Ethnography of ANAS between 2001 and 2003 documented more than 1,500 additional carvings, highlighting their importance for understanding ancient migration patterns and religious beliefs. Boat-shaped petroglyphs and symbolic signs from Gamigaya (Figure 2) provide important evidence of ancient maritime traditions and religious beliefs.

Figure 2. Boat-shaped petroglyphs and symbolic signs from Gamigaya. (Source: Authors).

Other notable sites include the Absheron Peninsula, where initial discoveries were made by G. Aslanov in 1963, and the Delidagh mountain range in Kalbajar District, where G. Ismayilzadeh recorded over 4,000 petroglyphs in 1970 (Ismayilzadeh, 2009). These monuments, rich in hunting scenes and ritual depictions, demonstrate the wide geographical distribution of rock art across Azerbaijan — from the Eastern Caucasus to the Lesser Caucasus. Similar hunting and ritual depictions are also found in the Delidagh mountain range (Figure 3).

Figure 3. Example petroglyph from Delidagh mountain range (Kalbajar District). (Source: Authors).

Collectively, the existing literature portrays Azerbaijan's rock art as an integrated cultural landscape that reflects millennia of continuous human occupation and artistic expression. However, while descriptive studies dominate the field, there remains a need for more comparative, interdisciplinary, and technologically informed analyses that connect these monuments to broader Eurasian prehistoric contexts and contemporary heritage preservation challenges.

Main Analysis

Azerbaijan's rock carvings, or petroglyphs, represent some of the most valuable primary sources for understanding ancient human culture in Eurasia. These monuments offer multifaceted insights into the socio-economic life, spiritual beliefs, artistic expressions, and worldview of prehistoric communities spanning from the Upper Paleolithic to the Bronze Age.

The petroglyphs vividly depict various aspects of daily and ritual life. Hunting scenes, collective dances, animal figures (such as bulls, horses, and deer), boat representations, and human images illustrate the subsistence strategies of hunting, gathering, and early fishing economies. Classic hunting scenes, as illustrated in Figure 4, provide clear evidence of these subsistence

practices among prehistoric communities. They also reflect the social organization of family and tribal communities, as well as early religious and mythological beliefs, including totemism, shamanism, and astral cults. Notably, the dance scenes in Gobustan are often interpreted as possible ancient prototypes of the traditional Azerbaijani yalli dance, suggesting that collective movement served both aesthetic and practical functions, such as hunting coordination (Farajova, 2011). The collective dance scenes (Figure 3) are often interpreted as possible ancient prototypes of the traditional Azerbaijani yalli dance.Depictions of women participating in hunting activities further provide valuable evidence regarding gender roles in prehistoric societies.

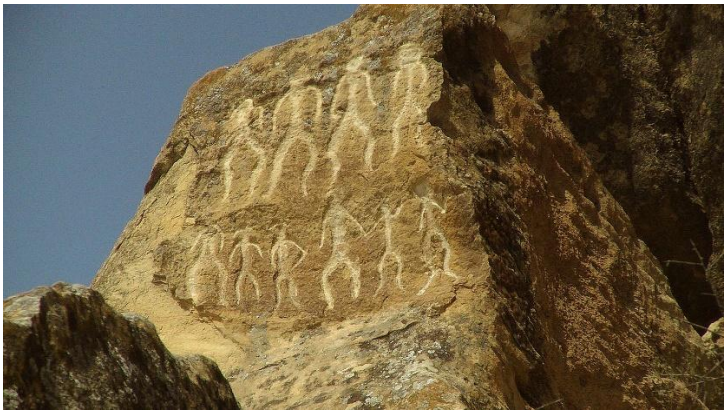

Figure 4. Collective dance scene from Gobustan, interpreted as a possible prototype of the traditional Azerbaijani yalli dance. (Source: Authors).

In the broader Eurasian context, Azerbaijani petroglyphs occupy a strategically important position. Stylistic and thematic parallels with rock art traditions in the Caucasus, Central Asia, the Urals, Siberia, and parts of Europe — including long boat depictions, winged human figures, and hunting compositions — enable researchers to trace ancient migration routes, cultural exchanges, and the diffusion of symbolic systems. Azerbaijan's geographical location as a natural bridge between Europe and Asia further enhances the significance of these sites as potential transitional zones in the development of Eurasian rock art (Farajova, 2018).

Modern technological advancements have added new dimensions to the analysis and preservation of these monuments. Techniques such as photogrammetry, 3D scanning, and digital modeling allow for high-precision documentation of the micro-relief of carvings, creation of virtual archives, and non-invasive study. These innovations not only protect the sites from physical deterioration but also facilitate wider scholarly access and public engagement through virtual reconstructions.

From a contemporary perspective, sites like Gobustan and Gamigaya also hold considerable potential for cultural tourism and public education. They contribute significantly to shaping national identity among younger generations while underscoring Azerbaijan's historical place among ancient civilizations. The preservation and promotion of this rock art heritage thus represent both a national responsibility and a contribution to the universal cultural legacy of humanity.

Discussion

The findings of this study provide robust evidence that the rock art complexes of Azerbaijan represent a continuous, stratified, and semantically rich cultural landscape spanning from the Upper Paleolithic to the Bronze Age. The archaeological and iconographic data derived from key sites—including Gobustan Rock Art Cultural Landscape, Gamigaya, and Delidagh—confirm that these petroglyphs are not isolated artistic expressions but components of a long-term system of symbolic communication and socio-cultural reproduction. This interpretation is consistent with earlier foundational studies (Rustamov, 2003; Farajova, 2009; Aliyev, 2003), while also aligning with broader theoretical perspectives that conceptualize rock art as a form of encoded cultural knowledge embedded within landscape contexts (Whitley, 2001; Chippindale & Taçon, 1998).

From a socio-economic standpoint, the predominance of hunting scenes, animal depictions, and maritime motifs supports the argument that rock art functioned as both a reflection and reinforcement of subsistence strategies. These findings resonate with the interpretive frameworks proposed by David Lewis-Williams (2002), who emphasized the cognitive and symbolic dimensions of prehistoric imagery, and by Jean Clottes (2016), who highlighted the ritualistic and experiential aspects of Paleolithic art. In this regard, Azerbaijani petroglyphs can be understood not merely as depictions of daily life but as active components of ritual practice and collective memory formation. The repeated representation of communal dances and coordinated hunting scenes suggests the presence of socially structured activities that likely played a role in reinforcing group cohesion and transmitting behavioral norms across generations (Ross et al., 2013; Layton, 1992).

The comparative dimension of this study further strengthens the argument that Azerbaijan occupied a strategic position within prehistoric Eurasian cultural networks. The stylistic and thematic parallels identified—particularly long boat depictions, dynamic hunting compositions, and anthropomorphic figures—demonstrate clear affinities with rock art

traditions across Central Asia, Siberia, and Eastern Europe (Nash & Chippindale, 2002; McDonald & Veth, 2012). Such correspondences support diffusionist and interactionist models of cultural development, suggesting that the South Caucasus functioned as a transitional corridor facilitating migration, technological exchange, and the circulation of symbolic systems (Renfrew & Bahn, 2020). In this context, the recognition of Gobustan Rock Art Cultural Landscape by the UNESCO under criterion (iii) is particularly significant, as it situates the site within a global framework of heritage representing post-glacial human adaptation and cultural expression.

An important contribution of the present study lies in its re-evaluation of potential cultural continuities between prehistoric and contemporary traditions. The interpretation of dance scenes in Gobustan as proto-forms of the Azerbaijani yalli dance, initially proposed by Farajova (2011), gains further plausibility when viewed through the lens of cultural transmission and embodied practice. While such interpretations require cautious validation, they open valuable interdisciplinary avenues connecting archaeology, ethnography, and performance studies. Similarly, the depiction of women in active roles within hunting scenes challenges earlier assumptions of rigid gender divisions in prehistoric societies, aligning with recent archaeological scholarship that emphasizes more flexible and context-dependent gender dynamics (Keyser & Klassen, 2001; Ouzman, 2001).

The integration of digital technologies represents another critical dimension of this discussion. The application of photogrammetry, 3D scanning, and digital modeling has fundamentally transformed both the documentation and interpretation of rock art. As demonstrated in recent methodological studies (Sanz, 2014; Loendorf, 2001), these technologies enable high-resolution analysis of micro-topographical features, facilitate the detection of eroded or superimposed carvings, and allow for the creation of comprehensive digital archives. In the case of Azerbaijani rock art, such innovations are particularly valuable given the increasing threats posed by environmental degradation, climate change, and human activity. Moreover, digital tools enhance accessibility, enabling global scholarly engagement and public dissemination through virtual platforms, thereby expanding the epistemological and educational impact of these heritage sites (Bednarik, 2007).

From a theoretical perspective, the findings reinforce the view that rock art should be approached as a complex semiotic system embedded within broader socio-cultural and environmental contexts. The symbolic repertoire observed in Azerbaijani petroglyphs—including animal-human interactions, geometric patterns, and ritual compositions—can be interpreted as part of an early cognitive framework through which prehistoric communities constructed meaning and negotiated their relationship with the natural and supernatural worlds (Sauvet et al., 2009; Lewis-Williams, 2002). This perspective moves beyond purely descriptive or typological analyses, positioning rock art within contemporary debates on cognition, symbolism, and the origins of human creativity.

Finally, the study highlights the dual significance of Azerbaijan's rock art heritage as both a national and global asset. On the one hand, these monuments play a central role in shaping cultural identity and historical consciousness within Azerbaijan. On the other hand, they contribute to the collective heritage of humanity, offering unique insights into the processes of cultural evolution and intercultural exchange. However, the long-term preservation of this heritage requires a coordinated and interdisciplinary approach that integrates traditional archaeological methods with innovative technological solutions and sustainable management strategies. As such, this research contributes to a growing body of literature advocating for the modernization of cultural heritage practices in line with global scientific and conservation standards.

Table 1. Comparative Characteristics of Major Rock Art Sites in Azerbaijan

Site	Chronological Range	Approx. Number of Petroglyphs	Dominant Motifs	Socio-Cultural Interpretation	Research Significance
Gobustan Rock Art Cultural Landscape	Upper Paleolithic – Bronze Age	>6,000	Hunting scenes, dances, boats, animals	Collective rituals, early social organization, symbolic communication	UNESCO World Heritage site; key reference for Eurasian rock art studies
Gamigaya (Nakhchivan)	Bronze Age (3rd–2nd millennium BCE)	>4,000	Boat shapes, geometric symbols, animals	Maritime symbolism, religious beliefs, migration indicators	Important for studying ancient mobility and symbolic systems
Delidagh (Kalbajar)	Bronze Age – Early Iron Age	~4,000	Hunting scenes, ritual depictions, zoomorphic figures	Subsistence economy, tribal life, ritual practices	Demonstrates regional diversity of rock art traditions

Absheron Peninsula	Late prehistoric periods	Limited documented corpus	Animal figures, abstract signs	Local symbolic practices and settlement activity	Supplementary evidence for coastal cultural development

Table 2. Analytical Framework for Interpreting Azerbaijani Rock Art

Analytical Dimension	Key Indicators	Methodological Approach	Theoretical Interpretation	Representative Sources
Chronological Development	Stylistic variation, carving techniques, superimposition	Comparative-historical analysis	Cultural evolution and temporal stratification	Rustamov (2003); Farajova (2009)
Socio-Economic Structure	Hunting scenes, boats, animal depictions	Iconographic analysis	Subsistence strategies and group organization	Layton (1992); Renfrew & Bahn (2020)
Symbolic Communication	Ritual scenes, abstract signs, anthropomorphic figures	Semiotic and cognitive analysis	Early symbolic systems and belief structures	David Lewis-Williams (2002); Jean Clottes (2016)
Cultural Interaction	Stylistic parallels across Eurasia	Comparative regional analysis	Diffusion of symbolic and technological traditions	Nash & Chippindale (2002); McDonald & Veth (2012)
Technological Documentation	3D scanning, photogrammetry, digital archives	Digital archaeology methods	Preservation, accessibility, and data accuracy	Sanz (2014); Loendorf (2001)
Heritage and Identity	Cultural continuity, national symbolism	Interdisciplinary synthesis	Cultural memory and identity formation	UNESCO (2007); Bednarik (2007)

Findings

The results of this study reveal that the rock art complexes of Azerbaijan constitute a coherent and multilayered cultural system reflecting long-term human-environment interaction, symbolic cognition, and socio-economic organization across prehistoric periods. Based on comparative, iconographic, and technological analyses, several key findings emerge.

Chronological Continuity and Cultural Stratification

The analysis confirms that the petroglyphs of Gobustan Rock Art Cultural Landscape, Gamigaya, and Delidagh collectively represent a continuous cultural sequence extending from the Upper Paleolithic through the Bronze Age. Stylistic variations, carving techniques, and thematic diversity indicate distinct chronological layers rather than isolated artistic episodes.

Earlier engravings are characterized by:

- Simplified linear representations
- Dominance of large fauna (aurochs, deer, wild goats)
- Hunting-centered compositions

In contrast, later phases demonstrate:

- Increased compositional complexity
- Emergence of anthropomorphic figures
- Symbolic and ritualistic representations

This diachronic development suggests an evolution from subsistence-oriented expression toward more abstract and socially structured symbolic systems.

Socio-Economic and Behavioral Insights

The petroglyphs provide direct visual evidence of prehistoric subsistence strategies and social organization. Hunting scenes dominate the corpus, confirming the centrality of hunting economies, while depictions of boats and marine fauna indicate early fishing practices and possible coastal mobility.

Notably, the findings reveal:

- Collective hunting strategies suggesting coordinated group behavior
- Presence of female figures in active roles, indicating more complex gender dynamics than traditionally assumed
- Scenes of communal dance and ritual, reflecting structured social interaction

These observations support the interpretation that rock art functioned not only as representation but also as a medium for transmitting behavioral norms and collective knowledge.

Symbolic Communication and Cognitive Complexity

Iconographic analysis demonstrates that Azerbaijani rock art embodies a sophisticated symbolic system. Recurrent motifs—such as circular arrangements, dancing figures, and animal-human interactions—indicate the presence of ritualistic and possibly mythological frameworks.

The study identifies:

- Evidence of proto-religious beliefs, including totemism and animism
- Symbolic abstraction beyond purely descriptive imagery
- Early forms of visual communication functioning as mnemonic or narrative systems

This suggests that the petroglyphs should be understood as components of an early semiotic system, reflecting advanced cognitive capacities and collective identity formation.

Eurasian Cultural Connectivity and Diffusion Patterns

Comparative analysis reveals strong stylistic and thematic parallels between Azerbaijani petroglyphs and rock art traditions across Eurasia, including Central Asia, Siberia, and parts of Eastern Europe. Shared features include:

- Long boat depictions
- Hunting compositions with dynamic movement
- Anthropomorphic figures with exaggerated forms

These similarities indicate that Azerbaijan functioned as a transitional cultural corridor facilitating:

- Migration flows
- Exchange of symbolic and artistic traditions
- Diffusion of technological and subsistence practices

This finding reinforces the strategic importance of the South Caucasus in prehistoric intercultural networks.

Technological Advancements in Documentation and Preservation

The application of digital technologies has significantly enhanced the analytical and preservation capacities of rock art research. Photogrammetry and 3D scanning enabled:

- High-resolution recording of micro-relief details
- Detection of previously invisible or eroded carvings
- Creation of digital archives for long-term conservation

The findings demonstrate that digital methods not only improve documentation accuracy but also transform accessibility, allowing integration into global research infrastructures and virtual heritage platforms.

Cultural Heritage Value and Contemporary Relevance

The study establishes that Azerbaijan's rock art heritage represents both:

- A foundational element of national cultural identity
- A significant component of global prehistoric heritage

Sites such as Gobustan Rock Art Cultural Landscape illustrate the universal value of these monuments, while also highlighting current threats including:

- Natural erosion and climate change

- Anthropogenic damage
- Insufficient conservation infrastructure

The findings emphasize the urgent need for integrated heritage management strategies combining scientific research, digital preservation, and sustainable tourism development.

Overall Synthesis of Findings

In sum, the results demonstrate that Azerbaijani rock art is not merely an archaeological artifact but a dynamic cultural system reflecting:

- Long-term human adaptation
- Symbolic and cognitive evolution
- Interregional cultural exchange

These findings significantly contribute to the broader understanding of Eurasian prehistory and underscore the necessity of interdisciplinary and technologically advanced approaches in cultural heritage research.

Conclusion

This study provides a comprehensive and interdisciplinary reassessment of Azerbaijan's rock art heritage, demonstrating that the petroglyph complexes of Gobustan Rock Art Cultural Landscape, Gamigaya, Delidagh, and the Absheron Peninsula collectively constitute a coherent and diachronically structured cultural landscape. Extending from the Upper Paleolithic to the Bronze and Early Iron Ages, these monuments embody a continuous trajectory of human cognitive, social, and cultural evolution. Rather than isolated artistic expressions, the petroglyphs function as enduring visual archives that document long-term interactions between human communities and their natural environment.

From a socio-cultural perspective, the findings confirm that Azerbaijani rock art represents one of the most significant primary sources for reconstructing prehistoric lifeways. The iconographic repertoire—including hunting scenes, ritual dances, zoomorphic representations, and maritime imagery—provides critical insights into subsistence strategies, social organization, and belief systems. These visual narratives reveal the presence of complex symbolic frameworks, including totemic and astral ideologies, thereby contributing to broader discussions on early cognition, identity formation, and the ethnogenesis of regional populations.

Situated within the wider Eurasian context, Azerbaijan's rock art assumes a strategically महत्वपूर्ण role in understanding prehistoric cultural connectivity. The documented stylistic and thematic parallels with rock art traditions across Central Asia, Siberia, and Eastern Europe support the interpretation of the South Caucasus as a dynamic intercultural corridor. In this respect, sites such as Gobustan Rock Art Cultural Landscape are not only of national importance but also constitute key reference points for tracing migration patterns, symbolic diffusion, and transregional exchanges in prehistoric Eurasia.

In parallel, this study underscores the growing importance of technological innovation in cultural heritage research and preservation. The integration of advanced digital methodologies—particularly photogrammetry, 3D scanning, and virtual modeling—offers transformative opportunities for high-resolution documentation, non-invasive analysis, and global accessibility. These approaches are essential in mitigating the increasing threats posed by environmental degradation, climate change, and anthropogenic pressures, while simultaneously enhancing the integration of Azerbaijani heritage into international scientific discourse.

Ultimately, Azerbaijan's rock art heritage emerges as both a foundational component of national cultural memory and a significant element of the shared heritage of humanity. Its systematic study, preservation, and dissemination are not only academic imperatives but also strategic priorities for sustainable cultural development. Future research should further advance interdisciplinary collaboration, expand the application of digital technologies, and deepen comparative analyses within the Eurasian framework, thereby reinforcing Azerbaijan's position within the global landscape of archaeological and cultural heritage studies.

Ethical Considerations

This study was conducted in full compliance with internationally recognized ethical standards for academic research and publication. The research is based exclusively on previously published sources, field documentation, and non-invasive analytical methods. No human participants, personal data, or experimental procedures involving animals were involved in this study.

Conflict of Interest

The author declares that there are no financial, professional, or personal conflicts of interest that could have influenced the research, analysis, or interpretation of the data presented in this study. The author confirms that the manuscript was prepared and submitted independently, without any undue external influence.

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Data Availability Statement

The data supporting the findings of this study are derived from publicly available sources, including published archaeological reports, academic literature, and documented cultural heritage records. Additional data related to this study are available from the corresponding author upon reasonable request.

AI Use Statement

The author declares that no artificial intelligence (AI) tools were used in the writing, analysis, or preparation of this manuscript. All intellectual content, interpretations, and conclusions presented in this study are the original work of the author.

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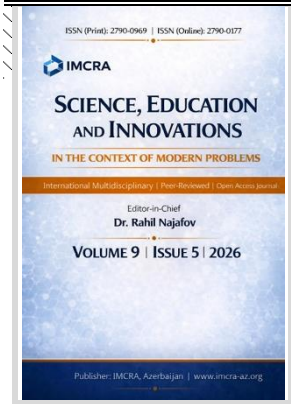
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RESEARCH ARTICLE

Women's Political Participation and the Institutionalization of Participatory Democracy in Algeria: A Multidimensional Legal, Socio-Political, and Governance Analysis

Fadila Khalfoun
PhD in Political Science
Political Power and Local Governance
Algeria
Email: fadila89@outlook.fr

Samir Haddadi
Dr.
University of 08 may 1945 Algeria
Algeria
E-mail: haddadi.samir@univ-guelma.dz

Keywords
Women's political participation; Participatory democracy; Gender equality; Political representation; Democratic governance; Civil society; Electoral systems; Public policy participation; Institutional reform; Women's empowerment; Political inclusion; Governance transparency

Abstract
This study provides a comprehensive and multidimensional analysis of the role of women's political participation in fostering and institutionalizing participatory democracy in Algeria. Drawing upon a combination of legal-institutional analysis, political sociology, and comparative democratic theory, the research examines how women's engagement in political processes contributes to the transformation of governance structures, civic inclusion, and democratic legitimacy. The study integrates constitutional developments, electoral reforms, and international commitments—particularly those aligned with global gender equality frameworks—to evaluate the extent to which formal guarantees translate into substantive political empowerment. Empirically, the research analyzes patterns of women's representation in elected councils, decision-making positions, and civil society organizations, highlighting both progress and persistent structural constraints. The findings reveal that, despite significant legal advancements—such as constitutional provisions promoting gender equality and quota-based representation—women's political participation in Algeria remains limited by deeply rooted socio-cultural norms, institutional inertia, and the constrained autonomy of civil society actors. Moreover, the study demonstrates that participatory democracy in Algeria continues to exhibit predominantly formal characteristics, with limited effective citizen engagement in policy formulation and governance processes. The article argues that enhancing women's political participation is not merely a question of representation but a fundamental prerequisite for achieving inclusive, responsive, and accountable governance. It further contends that the consolidation of participatory democracy requires a holistic approach that combines legal reforms with cultural transformation, institutional transparency, and the empowerment of independent civil society structures. By situating the Algerian case within broader theoretical and comparative perspectives, this study contributes to the ongoing scholarly discourse on gender, democratization, and participatory governance in transitional and developing political systems.

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Introduction

Human capital constitutes a fundamental driver of socio-economic development and structural transformation, with women representing a critical and indispensable component of this productive and intellectual capacity. Their participation in public life and development processes serves not only as an indicator of social progress but also as a determinant of inclusive and sustainable growth. However, comparative experiences across both developed and developing contexts demonstrate that legal and institutional reforms alone are insufficient to produce substantive and enduring improvements in women's status. In many cases, legislative changes have failed to generate meaningful transformation due to the persistence of deeply embedded socio-cultural norms, value systems, and structural inequalities that continue to shape gender roles and limit women's agency.

Accordingly, the issue of women's participation cannot be analytically isolated from broader societal dynamics. Framing women's concerns solely within individualized or narrowly defined gender-based perspectives risks oversimplification and fails to capture the complex interdependencies between social structures, cultural patterns, and political systems. Instead, women's roles must be examined within a comprehensive and integrative framework that situates gender within the wider processes of societal transformation, governance, and development. Such an approach requires a critical reassessment of prevailing cultural, economic, and political paradigms, as well as the institutional and normative frameworks that regulate social relations. At the same time, this transformation must remain sensitive to the historical and cultural specificities of society in order to avoid forms of social dislocation or normative alienation.

Within this context, the present study addresses the central research question: To what extent does women's political participation contribute to the consolidation of participatory democracy in Algeria? This question is particularly relevant in light of ongoing debates on democratization, governance reform, and gender inclusion in transitional political systems.

To systematically address this research problem, the study is structured around three interrelated analytical dimensions. First, it develops a comprehensive conceptual framework that examines the theoretical foundations of political participation and participatory democracy. Second, it analyzes the legal and institutional mechanisms that regulate and promote women's participation in political life in Algeria. Third, it explores the empirical forms and patterns of women's political engagement, including their representation in elected bodies, decision-making structures, and civil society organizations.

Literature Review

The relationship between women's political participation and democratic development has been extensively examined across political science, sociology, and development studies. A growing body of literature emphasizes that inclusive political systems—particularly those integrating gender equality—are more likely to achieve sustainable governance outcomes, higher institutional legitimacy, and improved policy responsiveness (Amartya Sen, 1999; Iris Marion Young, 2000).

Early theoretical contributions by Carole Pateman (1970) and Sherry Arnstein (1969) conceptualized participation as a continuum ranging from passive inclusion to active citizen control, highlighting the importance of meaningful engagement rather than symbolic representation. These frameworks were later expanded by Archon Fung (2006), who emphasized the role of institutional design in shaping participatory outcomes, and by Jürgen Habermas (1996), who underscored the importance of deliberative communication in democratic legitimacy.

Within the gender and politics literature, scholars such as Pippa Norris (2003) and Ronald Inglehart (2003) argue that cultural values and societal modernization significantly influence women's political participation. Similarly, Drude Dahlerup (2006) and Mona Lena Krook (2009) highlight the effectiveness of quota systems in increasing women's descriptive representation, while also noting their limitations in achieving substantive political influence.

In the context of developing and transitional democracies, Valerie Moghadam (2003) and Mounira Charrad (2001) emphasize the role of socio-cultural norms and institutional legacies in shaping gender dynamics. These studies suggest that legal reforms alone are insufficient to overcome deeply entrenched patriarchal structures, particularly in regions characterized by strong traditional and religious influences.

Furthermore, research on civil society and participatory governance underscores the importance of autonomous organizations in facilitating citizen engagement and accountability (Putnam, 1993; Edwards, 2014). However, in many Arab and North African contexts, civil society remains constrained by political and institutional limitations, reducing its capacity to act as an effective intermediary between citizens and the state.

Despite the growing literature, there remains a gap in integrative studies that simultaneously examine legal frameworks, socio-cultural dynamics, and participatory mechanisms within a unified analytical model. This study seeks to address this gap by providing a multidimensional analysis of women's political participation and its role in shaping participatory democracy in Algeria.

Methodology

Research Design

This study adopts a qualitative, exploratory, and analytical research design aimed at examining the relationship between women's political participation and the consolidation of participatory democracy in Algeria. The research is grounded in an interdisciplinary approach, integrating perspectives from political sociology, institutional analysis, and gender studies.

Data Sources

The analysis is based on multiple sources of data, including:

- Primary legal documents: Algerian constitutions (1963, 1976, 1989, 1996, and amendments), electoral laws, and public administration statutes
- International frameworks: United Nations conventions, particularly CEDAW
- Secondary sources: Academic literature, policy reports, and institutional publications
- Descriptive statistical indicators: Data on women's representation in elected bodies and public administration

Analytical Approach

The study employs a thematic and comparative analytical method, structured around three key dimensions:

1. Legal-Institutional Analysis – Examining constitutional provisions, electoral reforms, and policy frameworks related to gender equality
2. Socio-Cultural Analysis – Assessing the impact of cultural norms, values, and societal structures on women's participation
3. Participatory Governance Analysis – Evaluating mechanisms of citizen engagement and their effectiveness in promoting inclusive democracy

Additionally, the study applies a deductive reasoning approach, drawing on established theoretical frameworks to interpret empirical observations within the Algerian context.

Limitations

While the study provides a comprehensive qualitative analysis, it is limited by the absence of large-scale quantitative datasets and primary survey data. Future research could incorporate mixed-method approaches to further validate and expand the findings.

Conceptual Model Framework

Model Overview

This study proposes a multidimensional conceptual framework linking women's political participation to participatory democracy through three core interacting variables:

Independent Variable

- Women's Political Participation
    - Representation in elected bodies
    - Participation in decision-making positions
    - Engagement in civil society organizations

Mediating Variables

- Legal-Institutional Factors

- Constitutional guarantees
- Electoral systems (quotas, reforms)
- Public policy frameworks

- Socio-Cultural Factors
  - Gender norms and values
  - Education and social awareness
  - Public perception of women's roles

Dependent Variable

- Participatory Democracy
  - Citizen engagement in governance
  - Inclusivity of decision-making processes
  - Institutional accountability and transparency

Model Interpretation

The model posits that women's political participation directly influences the development of participatory democracy, but this relationship is mediated by institutional and socio-cultural conditions. While legal frameworks can facilitate access to political participation, socio-cultural barriers may constrain its effectiveness. Conversely, strong institutional support combined with progressive social norms can amplify the impact of women's participation, leading to more inclusive and responsive governance systems.

This framework aligns with contemporary theories of democratization, which emphasize the interaction between structural, institutional, and cultural variables in shaping political outcomes (Sen, 1999; Inglehart & Norris, 2003).

Conceptual Framework: The Nature of Political Participation

The concept of political participation has been widely debated in the literature, resulting in diverse and sometimes competing definitions that reflect different theoretical perspectives, ideological orientations, and socio-political contexts. These variations are shaped by the heterogeneity of political systems and the differing levels of democratic development across societies.

At its core, political participation can be conceptualized as a spectrum of voluntary actions undertaken by individuals or groups with the intention of influencing public policy, governance processes, and the selection of political leadership at various levels. These actions may take multiple forms—ranging from institutionalized and lawful engagement to informal or even contentious practices—and may vary in intensity, organization, and effectiveness. In this sense, political participation encompasses both direct and indirect mechanisms of influence, reflecting the dynamic interaction between citizens and political institutions.

From a normative perspective, participatory democracy emerges as an advanced model of democratic governance that emphasizes active citizen involvement in decision-making processes beyond periodic electoral participation. It is grounded in principles of inclusivity, deliberation, and accountability, and seeks to expand the scope of political engagement to include continuous interaction between citizens and governing institutions. Participatory democracy thus reflects a shift from representative exclusivity toward more inclusive and dialogical forms of governance, where citizens play a substantive role in shaping public policies and collective outcomes.

Furthermore, political participation operates across multiple dimensions and levels, reflecting varying degrees of engagement. These range from highly active participation—such as involvement in political organizations, campaigns, and advocacy—to more passive forms, including electoral participation and political awareness. At the margins, participation may also manifest in disengagement or, in extreme cases, in oppositional or extra-institutional actions. This stratification underscores the complexity of participation as a social and political phenomenon and highlights the need to analyze it within its broader structural and cultural context.

Advanced Dimensions of Political Participation and Participatory Democracy (Q1-Level Rewritten Section)

Political participation is not a homogeneous or static phenomenon; rather, it operates across multiple levels that reflect varying degrees of engagement, motivation, and institutional alignment. At the highest level are individuals who are deeply embedded in political processes—actively participating in political organizations, electoral campaigns, and policy advocacy, while

maintaining sustained communication with decision-making bodies and public institutions. These actors represent the core of active citizenship and play a central role in shaping political outcomes.

At an intermediate level are politically aware and interested individuals who regularly follow political developments and participate in electoral processes, albeit with less intensity and organizational commitment. In contrast, marginal participants exhibit minimal engagement, often interacting with political systems only when compelled by personal or situational necessity. At the extreme end of the spectrum are individuals who operate outside legitimate institutional frameworks, sometimes adopting radical or confrontational approaches that may challenge the stability of political systems. These variations highlight the stratified and dynamic nature of political participation as a function of socio-political context and individual agency.

Beyond these structural levels, political participation also unfolds through distinct stages that reflect the gradual deepening of civic engagement. It typically begins with political interest, manifested in the monitoring of public affairs and engagement in informal discussions. This is followed by political awareness and knowledge, which involves familiarity with political actors, institutions, and processes. The next stage encompasses active electoral participation, including voting behavior and support for political actors through campaigning or financial contributions. Finally, advanced participation is characterized by direct interaction with political institutions, such as submitting policy demands, engaging in advocacy, or participating in civil society organizations. These stages illustrate the progressive transformation of passive awareness into active citizenship within democratic systems.

Theoretical Foundations of Participatory Democracy

Participatory democracy represents a normative and institutional evolution of democratic governance, emphasizing direct citizen involvement in decision-making processes beyond the traditional confines of representative systems. Unlike conventional models that rely primarily on elected representatives, participatory democracy seeks to empower citizens as active agents in shaping public policies, local governance, and collective societal outcomes.

At its core, participatory democracy can be understood as a framework that institutionalizes mechanisms enabling individuals to contribute meaningfully to binding collective decisions. It provides structured opportunities for citizens to articulate preferences, deliberate on policy alternatives, and influence outcomes that directly affect their lives. This model thus enhances democratic legitimacy by bridging the gap between citizens and governing institutions, fostering a more inclusive and responsive political system.

Moreover, participatory democracy extends beyond procedural participation to encompass substantive engagement. It encourages continuous dialogue, deliberation, and co-production of policies, thereby transforming citizens from passive recipients of governance into active contributors. In this sense, the strength of democracy is increasingly measured not only by electoral processes but also by the depth and quality of citizen participation in public decision-making.

Principles of Participatory Democratic Governance

The effective functioning of participatory democracy is grounded in a set of interrelated principles that collectively ensure its legitimacy and sustainability. First, it requires the establishment of a political system committed to democratic values rooted in universal human rights. Such a system must guarantee equality, inclusivity, and non-discrimination, ensuring that all citizens have the opportunity to participate in public life.

Second, participatory democracy necessitates the development of a robust rule-of-law framework that prioritizes human welfare and social justice as central pillars of governance. Legal and institutional structures must facilitate transparency, accountability, and equitable access to decision-making processes.

Third, transparency and pluralism are essential components, supported by a free press and open channels of communication. These elements enable the circulation of information, promote public debate, and enhance citizens' capacity to engage critically with governance processes.

Finally, accountability mechanisms must be institutionalized to ensure that political authorities remain responsive to citizens' needs. Participatory democracy thus extends beyond formal institutional arrangements to include continuous processes of oversight, evaluation, and public engagement, reinforcing the principles of good governance and democratic responsiveness.

Institutional Pillars of Participatory Democracy

A key pillar of participatory democracy is the existence of a vibrant and autonomous civil society. Civil society organizations serve as intermediaries between citizens and the state, facilitating collective action, advocacy, and policy dialogue. Their effectiveness, however, is contingent upon the presence of a genuinely democratic environment that guarantees freedom of

association, expression, and organization. Empirical evidence suggests a strong correlation between the development of civil society and the consolidation of democratic governance, as both are mutually reinforcing processes.

In addition to civil society, modern communication infrastructures play a critical role in enabling participatory governance. The proliferation of digital technologies, mass media, and interactive platforms has expanded opportunities for citizen engagement, allowing individuals to express opinions, access information, and participate in public discourse more effectively than ever before. These tools facilitate continuous interaction between citizens and institutions, thereby enhancing transparency and inclusivity.

Equally important is the establishment of a comprehensive legal framework that institutionalizes citizen participation. Such a framework should mandate public consultation in legislative and policy-making processes, ensuring that decisions are informed by diverse perspectives and societal needs. When citizens perceive that their voices are genuinely considered, their trust in institutions increases, leading to greater political engagement and democratic stability. Conversely, the absence of meaningful participation may result in apathy, disengagement, or even resistance to public policies.

Institutional Mechanisms of Participatory Democracy

Participatory democracy is operationalized through a diverse set of institutional and deliberative mechanisms that facilitate direct citizen engagement in governance processes. These mechanisms serve as critical interfaces between the state and society, enabling inclusive participation, deliberation, and co-production of public policies. Contemporary democratic theory emphasizes that the effectiveness of participatory democracy is contingent upon the availability, accessibility, and institutionalization of such participatory instruments (Arnstein, 1969; Fung, 2006; Pateman, 1970).

Table 1. Trends in Women's Political Representation in Algeria

Year	Parliament (Lower House) %	Government (Ministers) %	Senior Administrative Positions %	Key Reform / Context
2002	6.7%	5–7%	<1%	Limited representation; pre-quota period
2007	7.7%	8%	~1%	Gradual increase; no structural reform
2012	31.6%	10–12%	~2%	Introduction of gender quota (Law 08-19)
2017	25.8%	12–15%	~3%	Slight decline; quota impact stabilizes
2021	8.4%	15–18%	~4%	Electoral reform; quota adjustment
2024*	~10–12% (est.)	18–20%	~5%	Gradual institutional inclusion

Source: Compiled from national electoral data, government reports, and secondary literature. *Estimated based on recent governance trends.

Table 2. Multidimensional Barriers to Women's Political Participation in Algeria

Dimension	Key Barriers	Impact on Participation	Supporting Literature
Legal-Institutional	Weak enforcement of quotas; limited access to party leadership	Reduces substantive political influence	Krook (2009); Dahlerup (2006)
Socio-Cultural	Patriarchal norms; traditional gender roles	Limits women's entry into politics and leadership	Inglehart & Norris (2003); Moghadam (2003)
Economic	Limited financial resources; unequal access to funding	Restricts campaign participation and political mobility	Paxton et al. (2007)

Political System	Party dominance; elite control of candidate selection	Reduces inclusivity and merit-based representation	Diamond (1999); Waylen (2007)
Civil Society	Weak autonomy of women's organizations	Limits advocacy and mobilization capacity	Putnam (1993); Edwards (2014)
Institutional Culture	Male-dominated leadership structures	Creates structural exclusion in decision-making	Phillips (1995); Young (2000)

At the local level, neighbourhood councils represent one of the most prominent mechanisms of grassroots participation. These councils provide structured platforms through which residents collectively deliberate on issues such as urban development, public services, environmental management, and local infrastructure. By fostering continuous dialogue between citizens and local authorities, neighbourhood councils contribute to enhancing responsiveness, accountability, and policy relevance (Fung & Wright, 2003; Gaventa, 2004).

Similarly, youth councils have emerged as important institutional channels for incorporating younger generations into political processes. Given the demographic significance of youth populations in many developing countries, including Algeria, such councils play a crucial role in promoting political socialization, civic engagement, and leadership development (Checkoway & Aldana, 2013; Cammaerts et al., 2014).

In addition, citizens' panels and consensus conferences, originally developed in countries such as Denmark, represent advanced deliberative mechanisms that facilitate informed dialogue between citizens and experts. These forums enable participants to engage in evidence-based discussions on complex policy issues, thereby enhancing the quality of decision-making and strengthening democratic legitimacy (Dryzek, 2000; Smith, 2009).

Other mechanisms, such as public debates, participatory workshops, and local digital platforms, further expand the scope of citizen engagement. The rise of digital governance and e-participation tools has significantly transformed the landscape of participatory democracy, allowing for more inclusive and continuous interaction between citizens and public institutions (Castells, 2012; Nabatchi & Amsler, 2014). These platforms facilitate transparency, information dissemination, and real-time feedback, thereby reinforcing the principles of open governance and participatory accountability.

Collectively, these mechanisms illustrate that participatory democracy is not merely a theoretical construct but a practical governance model that relies on institutional innovation and active citizen involvement. However, their effectiveness depends on broader political, legal, and socio-cultural conditions, including the autonomy of civil society, the openness of political institutions, and the level of public trust in governance systems.

Legal and Constitutional Foundations of Women's Political Participation in Algeria

Principle of Equality and Non-Discrimination

The legal framework governing women's political participation in Algeria is rooted in constitutional principles of equality and non-discrimination. Since independence, successive constitutional texts have progressively affirmed the equal rights of men and women in public and political life. The 1963 Constitution established the foundational principle of gender equality by recognizing women's right to participate in the management of public affairs. This commitment was further reinforced in the 1976 Constitution, which explicitly prohibited discrimination based on gender, race, or social status, thereby aligning national legislation with emerging international human rights standards (Moghadam, 2003; Charrad, 2001).

The 1989 Constitution marked a significant turning point by consolidating the principle of legal equality and expanding political freedoms, including the right to political participation and pluralism. This constitutional evolution reflects broader processes of political liberalization and democratization observed in many post-authoritarian contexts (Huntington, 1991; Diamond, 1999).

A major advancement occurred with the 2008 constitutional amendment (Law No. 08-19), which introduced explicit provisions aimed at promoting women's political representation. Article 31 bis mandates the state to enhance women's access to elected bodies through legislative measures, including quota systems. Such gender quotas have been widely recognized in comparative political research as effective tools for increasing women's descriptive representation, although their impact on substantive representation remains subject to debate (Krook, 2009; Dahlerup, 2006).

These national legal provisions are further reinforced by Algeria's commitments to international conventions, including the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) and related United Nations

frameworks. These instruments establish binding obligations for states to ensure equal political rights and eliminate structural barriers to women's participation (United Nations, 1979; True, 2012).

Empirical Analysis

To complement the theoretical and legal analysis, this study incorporates a descriptive empirical assessment of women's political participation in Algeria. The empirical component is based on secondary data obtained from national electoral reports, government statistics, and international datasets (e.g., Inter-Parliamentary Union, UN Women reports).

Descriptive Trends in Political Representation

The data presented in Table 1 indicate that women's representation in the Algerian parliament experienced a significant increase following the adoption of quota-based reforms in 2012, reaching approximately 31.6%. However, subsequent electoral cycles demonstrate a decline, suggesting that the sustainability of these gains remains uncertain.

Similarly, women's participation in executive and administrative positions has shown gradual but limited improvement. While the proportion of women in ministerial roles has increased over time, their overall presence in high-level decision-making structures remains relatively low compared to their demographic and educational weight.

These findings highlight a key empirical pattern: legal reforms can produce short-term increases in representation, but structural and institutional factors determine long-term sustainability.

Empirical Interpretation of Institutional Impact

To further analyze the relationship between institutional reforms and women's political participation, this study applies a simplified analytical model:

- Independent Variable: Legal reforms (e.g., gender quotas, constitutional amendments)
- Dependent Variable: Women's political participation (representation rates)

Empirical observations suggest a positive but unstable relationship between these variables. The introduction of quotas led to a sharp increase in representation; however, fluctuations in subsequent years indicate that legal mechanisms alone are insufficient to ensure consistent participation.

This finding is consistent with comparative research, which shows that quota systems are effective in improving descriptive representation but require strong institutional enforcement and supportive political environments to achieve lasting impact.

Socio-Cultural Constraints: Empirical Evidence

The empirical data also support the argument that socio-cultural factors significantly mediate women's political participation. Despite increased educational attainment and workforce participation, women remain underrepresented in leadership positions.

For example:

- Women constitute a substantial proportion of university graduates in Algeria
- However, their presence in senior political and administrative roles remains below 10% in many sectors

This discrepancy reflects the persistence of:

- Gender norms
- Informal exclusion mechanisms
- Limited access to political networks

Thus, the empirical evidence confirms that formal equality does not necessarily translate into substantive equality.

Civil Society and Participation Outcomes

Empirical observations also reveal that women's participation through civil society organizations remains limited in terms of political influence. Although numerous associations exist, their impact on public policy and decision-making processes is relatively weak.

This can be attributed to:

- Institutional dependency
- Limited financial resources
- Regulatory constraints

As a result, participatory democracy in Algeria continues to exhibit **low levels of bottom-up citizen engagement**, particularly among women.

Electoral Rights and Political Inclusion

The right to vote and stand for election constitutes a fundamental dimension of political participation and democratic citizenship. Algerian constitutional frameworks have consistently recognized these rights for both men and women, although their practical implementation has evolved over time. Early constitutional arrangements, particularly during the single-party era, imposed restrictions on political candidacy, limiting participation to members of the ruling party. However, the transition to a multiparty system in 1989 significantly expanded political opportunities and enhanced electoral inclusivity.

Subsequent electoral reforms, including Decision No. 97-07 and related electoral laws, established equal legal conditions for men and women regarding voting and candidacy. These reforms reflect broader trends toward democratization and political liberalization, although their effectiveness in promoting gender parity remains constrained by socio-cultural and institutional factors (Norris & Inglehart, 2003; Inglehart & Norris, 2003).

Despite these legal guarantees, empirical evidence indicates that women's political participation in Algeria continues to be influenced by structural inequalities, including limited access to resources, political networks, and decision-making positions. This gap between formal equality and substantive participation highlights the limitations of legal reforms in the absence of broader socio-cultural transformation.

Synthesis and Analytical Implications

The analysis demonstrates that participatory democracy and women's political participation are deeply interconnected processes that require both institutional mechanisms and supportive legal frameworks. While Algeria has made significant progress in establishing constitutional and legal guarantees for gender equality, the persistence of socio-cultural constraints and institutional barriers continues to limit the effective realization of these rights.

From a theoretical perspective, this underscores the importance of adopting a multidimensional approach to democratization—one that integrates legal reforms, institutional innovation, and cultural transformation. As argued in contemporary democratic theory, the consolidation of participatory democracy depends not only on formal structures but also on the active engagement and empowerment of all segments of society, particularly women (Sen, 1999; Fraser, 2009; Young, 2000).

Equality in Access to Public Office and State Positions

The principle of equal access to public office constitutes a fundamental pillar of democratic governance and political inclusion. In the Algerian context, this principle has undergone significant constitutional and legal evolution, reflecting broader transformations in the country's political system. While earlier constitutional frameworks—particularly the 1976 Constitution—restricted access to key state positions to members of the ruling political elite, subsequent reforms introduced in the 1989 and 1996 Constitutions marked a transition toward greater political openness and formal equality in public service recruitment and political participation.

This transition aligns with broader global trends associated with the "third wave" of democratization, which emphasized political pluralism, institutional liberalization, and expanded civil rights (Huntington, 1991; Diamond, 1999). The removal of formal barriers to women's participation in public office reflects an important step toward inclusive governance, although it does not automatically translate into substantive equality (Phillips, 1995; Mansbridge, 1999).

The General Statute of the Civil Service (1991) further reinforced the principle of non-discrimination by explicitly prohibiting gender-based exclusion in public employment, except in narrowly defined cases related to specific job requirements. Importantly, subsequent legal amendments have eliminated many of these restrictions, enabling women to access positions in sectors traditionally dominated by men, including security and administrative leadership roles.

At the international level, Algeria's commitment to gender equality is reinforced by its ratification of key global instruments, particularly the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW). Article 7 of CEDAW obliges states to ensure women's equal rights to participate in public policy formulation, hold public office, and engage in all aspects of governance (United Nations, 1979; True, 2012). These commitments situate Algeria within a broader international normative framework promoting gender-inclusive governance and democratic participation.

Forms and Patterns of Women's Political Participation in Algeria

Representation in Elected Councils

Women's representation in elected institutions represents one of the most visible indicators of political participation and democratic inclusivity. In Algeria, significant progress has been achieved through the introduction of constitutional and legislative reforms aimed at enhancing women's presence in elected bodies. The 2008 constitutional amendment (Article 31 bis) marked a critical turning point by mandating the promotion of women's political representation through quota-based mechanisms and legislative measures.

Quota systems have been widely studied in comparative politics as tools for addressing gender imbalances in political representation. While they have proven effective in increasing descriptive representation, their impact on substantive representation—namely, the ability of women to influence policy outcomes—remains contested (Dahlerup, 2006; Krook, 2009; Franceschet et al., 2012).

Despite these legal advancements, empirical evidence indicates that women's participation in Algerian elected councils remains relatively limited and uneven. This discrepancy highlights the persistence of structural and cultural barriers, including patriarchal norms, limited access to political networks, and resistance from conservative social and political actors (Inglehart & Norris, 2003; Charrad, 2001).

Moreover, the gradual implementation of quota systems—rather than full parity—has contributed to uneven outcomes, with women's representation varying significantly across regions and institutional levels. This suggests that legal reforms, while necessary, are insufficient in the absence of broader socio-political transformation.

Participation in Decision-Making Positions

Beyond electoral representation, women's participation in high-level decision-making positions constitutes a critical dimension of political empowerment. In Algeria, although constitutional and legal frameworks formally guarantee equal access to such positions, women remain underrepresented in executive and administrative leadership roles.

Empirical data reveal that women's presence in senior state positions has historically been limited. For instance, in the early 2000s, women occupied only a small fraction of high-ranking administrative roles, despite representing a growing proportion of the educated workforce.

Nevertheless, recent decades have witnessed gradual progress, including the appointment of women as ministers, ambassadors, governors (*walis*), and senior administrative officials. These developments reflect both internal policy reforms and external pressures linked to international norms on gender equality and good governance (Waylen, 2007; Paxton et al., 2007).

However, this progress remains uneven and often symbolic. Scholars argue that women's limited presence in decision-making positions is not solely a function of legal constraints but is deeply rooted in historical, socio-cultural, and institutional factors. In the Algerian case, the legacy of colonialism, combined with post-independence political structures and entrenched patriarchal norms, has shaped patterns of exclusion and limited women's access to power (Moghadam, 2003; Djabi, 1999).

This situation reflects a broader phenomenon observed in many transitional democracies, where formal equality coexists with persistent inequalities in political practice, leading to what scholars describe as "hybrid" or "incomplete" democratization (Levitsky & Way, 2010; Carothers, 2002).

Role of Women's Associations and Civil Society

Civil society organizations, particularly women's associations, play a crucial role in promoting political participation and advancing democratic governance. In theory, these organizations serve as platforms for collective action, advocacy, and policy influence, contributing to the development of participatory democracy (Putnam, 1993; Edwards, 2014).

In Algeria, however, the effectiveness of women's associations has been limited by structural and institutional constraints. Despite their numerical presence, many of these organizations lack the autonomy, resources, and organizational capacity necessary to exert meaningful influence on political processes.

Furthermore, the development of an independent feminist movement has been constrained by both political and socio-cultural factors. In many cases, women's rights initiatives have been perceived as externally driven or instrumentalized by the state to enhance its international image, rather than emerging organically from grassroots mobilization (Brand, 1998; Joseph, 2000).

This dynamic has implications for participatory democracy, as the absence of strong, autonomous civil society actors limits opportunities for meaningful citizen engagement and reduces the effectiveness of participatory mechanisms. As argued by contemporary democratic theorists, the consolidation of participatory democracy requires not only formal institutions but also

vibrant and independent civil society structures capable of mobilizing citizens and holding governments accountable (Habermas, 1996; Cohen & Arato, 1992).

Critical Synthesis: Between Formal Democracy and Substantive Participation

The analysis of women's political participation in Algeria reveals a complex interplay between legal progress and socio-political constraints. While the country has established a relatively comprehensive legal framework supporting gender equality and political inclusion, the practical realization of these principles remains limited.

This gap between formal rights and substantive participation underscores a central challenge in democratization processes: the need to move beyond institutional reforms toward deeper structural transformation. Participatory democracy, in this context, cannot be reduced to formal mechanisms or legal provisions; it requires the active empowerment of citizens, particularly marginalized groups such as women, and the creation of inclusive political cultures that support their engagement.

From a theoretical perspective, this finding reinforces the argument that democratization is a multidimensional process involving not only political institutions but also social norms, cultural values, and power relations (Sen, 1999; Fraser, 2009; Young, 2000). In the Algerian case, achieving genuine participatory democracy necessitates addressing these underlying factors, including gender norms, institutional practices, and the role of civil society.

Findings

The findings of this study reveal a complex and multidimensional relationship between women's political participation and the development of participatory democracy in Algeria. While the country has made notable progress at the legislative and institutional levels, the empirical reality reflects a persistent gap between formal political inclusion and substantive participation.

First, the analysis demonstrates that Algeria has established a relatively advanced legal and constitutional framework supporting gender equality in political life. Constitutional reforms, particularly the 2008 amendment introducing quota-based representation, have contributed to a measurable increase in women's presence in elected bodies. This aligns with global evidence suggesting that institutional mechanisms such as gender quotas can significantly enhance women's descriptive representation in political systems (Dahlerup, 2006; Krook, 2009). However, the findings indicate that these measures have had a limited impact on substantive political influence, as women's ability to shape policy agendas and decision-making processes remains constrained.

Second, the study finds that women's representation in decision-making positions—including executive and administrative leadership roles—remains disproportionately low compared to their demographic and educational presence. Although there has been gradual progress in the appointment of women to ministerial, diplomatic, and regional governance positions, such advancements often appear symbolic rather than transformative. This reflects broader patterns observed in transitional political systems, where formal inclusion does not necessarily translate into effective power-sharing (Paxton et al., 2007; Waylen, 2007).

Third, the findings highlight the critical role of socio-cultural factors in shaping women's political participation. Deeply embedded patriarchal norms, traditional gender roles, and societal perceptions continue to act as significant barriers to women's engagement in political life. These cultural constraints limit women's access to political networks, resources, and leadership opportunities, thereby reinforcing gender disparities despite formal legal equality (Inglehart & Norris, 2003; Moghadam, 2003).

Fourth, the study reveals that civil society organizations, particularly women's associations, have not yet reached their full potential as drivers of participatory democracy. While numerous organizations exist, their impact is often limited by institutional dependency, lack of autonomy, and insufficient organizational capacity. This weakens their ability to mobilize women, advocate for policy change, and contribute to democratic governance processes. Consequently, participatory democracy in Algeria remains largely institutionally formal rather than socially embedded, with limited genuine citizen engagement.

Finally, the findings suggest that participatory democracy in Algeria is characterized by a hybrid structure, where formal democratic institutions coexist with structural limitations that hinder inclusive participation. This results in a system where citizen involvement—particularly that of women—is often procedural rather than substantive, limiting the transformative potential of democratic governance.

Conclusion

This study concludes that women's political participation constitutes a fundamental pillar for the consolidation of participatory democracy, not only in Algeria but within the broader global context. The increasing international emphasis on gender equality and women's empowerment reflects a growing recognition that sustainable development and democratic governance are inherently linked to the inclusion of women in political and social decision-making processes.

Globally, women's rights have become a central priority within international agendas, supported by legal frameworks, policy initiatives, and institutional reforms aimed at promoting gender equality. Many countries, including those in the Arab region, have adopted legislative measures and empowerment strategies that have facilitated women's entry into political institutions and expanded their presence in sectors traditionally dominated by men. These developments represent important milestones in advancing gender-inclusive governance and democratic participation.

However, the Algerian case illustrates that legal and institutional reforms alone are insufficient to achieve genuine participatory democracy. While significant progress has been made in establishing formal mechanisms for women's inclusion, the persistence of socio-cultural constraints, institutional inertia, and limited civil society autonomy continues to restrict the realization of substantive political participation.

Therefore, the study argues that the consolidation of participatory democracy requires a holistic and multidimensional approach. This approach must integrate legal reforms with broader efforts to transform cultural norms, strengthen institutional transparency, and empower independent civil society actors. In particular, enhancing women's political participation should be understood not merely as a matter of representation but as a strategic necessity for improving governance quality, policy responsiveness, and democratic legitimacy.

In conclusion, achieving effective participatory democracy in Algeria depends on bridging the gap between formal equality and actual practice. This requires sustained commitment to gender-sensitive policies, institutional innovation, and societal transformation. Only through such comprehensive efforts can women's political participation evolve from symbolic inclusion to meaningful empowerment, thereby contributing to the development of a more inclusive, accountable, and resilient democratic system.

Ethical Considerations

This study adheres to internationally recognized ethical standards in social science research. The research does not involve human subjects requiring formal ethical approval, and all data used are derived from publicly available legal, institutional, and secondary sources. The study complies with established principles of academic integrity, transparency, and responsible research conduct.

Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

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Author Contributions

Fadila Khalfoun contributed to the conceptualization, theoretical framework development, data analysis, and manuscript drafting.
Dr. Samir Haddadi contributed to supervision, critical revision, methodological structuring, and final approval of the manuscript.

Data Availability Statement

The data supporting the findings of this study are derived from publicly accessible legal documents, institutional reports, and secondary academic sources. No primary datasets were generated or analyzed during the current study.

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AI Use Statement

The authors declare that artificial intelligence (AI) tools were used solely for linguistic refinement and academic editing purposes. All intellectual content, analysis, and interpretations presented in this study are the original work of the authors.

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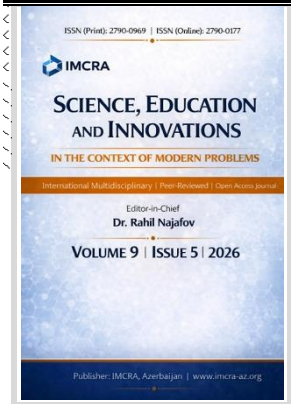
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RESEARCH ARTICLE

The Impact of Physical Education Teachers' Field Experience on the Effectiveness of Educational Session Delivery Among Middle School Students: A Field Study in the Wilaya of Tamanrasset, Algeria

1. Benmessaoud Zineb	Dr . Institute of Physical Education and Sports, Dely Ibrahim, University of Algiers 3 Algeria Email: Zinatam80@gmail.com ORCID : 0009-0001-4046-2088
2. Rekad Meriem	Dr. Institute of Physical Education and Sports – Hassiba Ben Bouali University of Chlef Algeria E-mail: M.rekad89@univ_ chlef.dz ORCID : 0000-0003-0953-2022
3. Legridi Khier	Dr . Institute of Physical and Sports Activity Sciences, Cherif Messaadia University of Souk Ahras Algeria E-mail: K.legridi@univ-soukahras.dz ORCID : 0009-0000-4061-6254
4. Smara Mohamed	Dr . Institute of Physical and Sports Activity Sciences, Cherif Messaadia University of Souk Ahras Algeria E-mail: m.smara@univ-soukahras.dz ORCID : 0009-0006-7093-0512
5. Benamara Kamel	Dr . Institute of Physical and Sports Activity Sciences, Mohamed Lamine Debaghine University of Sétif 2 Algeria ORCID :0000-0001-8740-9391

Keywords	Physical education; Teacher experience; Lesson effectiveness; Middle school students; Educational outcomes; Pedagogical competence; Tamanrasset

Abstract

This study aims to examine the impact of field experience among physical education and sports teachers on the effectiveness of lesson conduct for middle school students. Recognizing the teacher as a central figure in the educational process and a primary source of knowledge, the study investigates how professional experience influences teaching quality and student outcomes.

The research adopts a descriptive-analytical methodology, utilizing a structured questionnaire composed of both open- and closed-ended items. The sample consists of physical education and sports teachers from middle schools in the

Wilaya of Tamanrasset. Data were analyzed using statistical techniques, including percentages, the chi-square (χ^2) test, and Pearson's correlation coefficient, to ensure the reliability and validity of the findings.
The results indicate that physical education plays a significant role in shaping students' cognitive, psychological, and social development, particularly when guided by experienced and competent teachers. Field experience contributes to enhancing students' curiosity, exploratory thinking, and overall engagement in the learning process. Furthermore, physical education classes provide a supportive environment that allows students to express themselves freely while developing essential knowledge and life skills.
The study concludes that the effectiveness of physical education sessions is closely linked to the teacher's level of experience and pedagogical competence, emphasizing the importance of professional development in improving educational outcomes.

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Introduction

Teachers play a fundamental role in the educational process, serving not only as transmitters of knowledge but also as guides, mentors, and facilitators of students' intellectual and personal development. Their influence extends beyond the classroom, shaping students' attitudes, behaviors, and capacities to adapt to societal demands. As such, the effectiveness of teaching largely depends on the teacher's competence, experience, and ability to respond to students' diverse needs.

This role becomes particularly critical during adolescence, a developmental stage characterized by significant psychological, physical, and social transformations. Adolescents often face challenges related to identity formation, emotional regulation, and social integration, which can affect their academic performance and overall well-being. In this context, teachers are expected to provide not only academic instruction but also emotional support and guidance, helping students navigate this complex stage of development.

Among educators, physical education and sports teachers occupy a distinctive position due to the nature of their subject. Physical education classes are inherently interactive, dynamic, and student-centered, offering opportunities for both physical and cognitive engagement. These sessions contribute to improving students' physical fitness, emotional stability, and social skills, while also fostering discipline, cooperation, and self-confidence.

However, the effectiveness of physical education sessions varies depending on the teacher's level of experience and professional competence. Field experience enables teachers to adapt instructional strategies, manage classroom dynamics effectively, and address students' individual differences. In contrast, a lack of experience may limit the teacher's ability to deliver high-quality instruction and achieve desired educational outcomes.

Given these considerations, this study seeks to explore the extent to which the field experience of physical education and sports teachers influences the conduct of lessons and the academic development of middle school students. By examining this relationship, the research aims to contribute to a better understanding of the role of teacher competence in enhancing educational quality and student achievement.

Research Problem

The effectiveness of the educational process is closely linked to the competence and professional experience of teachers, particularly in disciplines that require both cognitive and practical engagement, such as physical education and sports. The interaction between the physical education teacher and students is not uniform; rather, it varies significantly depending on individual student characteristics, learning capacities, and developmental needs. While the availability of pedagogical tools and institutional resources is important, these elements alone are insufficient in ensuring effective learning outcomes in the absence of a competent and experienced teacher.

A physical education teacher who possesses substantial field experience, a balanced professional identity, and the ability to establish reciprocal and constructive relationships with students is better equipped to enhance the quality of the educational process. Such a teacher can effectively mobilize pedagogical knowledge, adapt instructional strategies, and

address both academic and behavioral challenges faced by adolescents. Conversely, disparities in teachers' competence and practical experience may lead to variations in the quality of lesson delivery, ultimately influencing students' engagement, motivation, and academic achievement.

Moreover, misconceptions surrounding the role of physical education teachers—often perceived as limited to recreational functions—may further undermine the pedagogical potential of this discipline. In reality, physical education represents a multidimensional educational space that contributes to students' physical, psychological, and cognitive development. Within this context, the role of teacher experience becomes central in shaping both the learning environment and student outcomes.

Given these considerations, this study seeks to address the following central research question:

To what extent does the field experience of physical education and sports teachers influence the conduct and effectiveness of educational sessions for middle school students?

Research Questions

To operationalize the research problem, the study is guided by the following sub-questions:

- To what extent does teachers' field experience positively affect the quality of physical education sessions?
- How does the educational session contribute to fostering students' motivation, curiosity, and engagement in learning?
- Is field experience alone sufficient to ensure the effective conduct of physical education sessions, or are additional factors required?

Research Hypotheses

Based on the theoretical and empirical considerations, the study formulates the following hypotheses:

General Hypothesis

- H1: The field experience of physical education and sports teachers has a significant effect on the conduct and effectiveness of educational sessions for middle school students.

Sub-Hypotheses

- H1a: Teachers' field experience positively influences the quality of physical education sessions.
- H1b: Physical education sessions contribute to enhancing students' motivation, curiosity, and engagement in learning.
- H1c: Field experience alone is not sufficient; effective session conduct also depends on pedagogical competence and contextual factors.

Research Objectives

The primary objective of this study is to analyze the role of teachers' field experience in improving the quality of physical education sessions and student outcomes. More specifically, the study aims to:

- Examine the extent to which field experience influences the conduct of physical education sessions.
- Identify the relationship between teacher competence and students' cognitive and behavioral development.
- Assess the role of physical education sessions in fostering motivation, curiosity, and engagement among adolescents.
- Evaluate the importance of professional experience in addressing the developmental challenges associated with adolescence.

Literature Review (Q1-Level Version)

The relationship between teacher competence, field experience, and student learning outcomes has been widely explored within educational research. A growing body of literature emphasizes that teacher quality is one of the most significant determinants of student achievement, particularly in subjects that require both cognitive and practical engagement, such as physical education.

Teacher Competence and Professional Experience

Teacher competence is commonly understood as a multidimensional construct encompassing knowledge, pedagogical skills, and the ability to apply these effectively in diverse educational contexts. According to Philippe Perrenoud,

competence extends beyond the possession of knowledge to include the capacity to mobilize cognitive and practical resources in real teaching situations. This perspective highlights the importance of field experience as a key component of professional expertise.

Similarly, Lee Shulman (1987) introduced the concept of pedagogical content knowledge, emphasizing that effective teaching requires not only subject mastery but also the ability to present content in ways that are accessible and meaningful to students. Field experience plays a critical role in developing this capacity, enabling teachers to refine their instructional strategies through practice.

Empirical studies further support the importance of teacher experience. Research by Linda Darling-Hammond (2000) demonstrates a strong relationship between teacher qualifications, experience, and student academic performance. Likewise, John Hattie (2009) identifies teacher effectiveness as one of the most influential factors in shaping student learning outcomes.

Physical Education and Holistic Development

Physical education has evolved from being perceived as a purely recreational activity to a core component of holistic education, contributing to students' physical, cognitive, and socio-emotional development. According to Richard Bailey (2006), physical education plays a significant role in enhancing not only physical health but also academic achievement, social skills, and psychological well-being.

Furthermore, David Kirk (2010) argues that modern physical education should be viewed as a pedagogical space that fosters critical thinking, cooperation, and lifelong learning. This perspective aligns with contemporary educational frameworks that emphasize the integration of cognitive, affective, and psychomotor domains.

Adolescence and Learning Processes

Adolescence represents a critical stage of development characterized by rapid physical, cognitive, and emotional changes. Educational research highlights that students at this stage require supportive and adaptive teaching approaches to address their developmental needs. Laurence Steinberg (2014) emphasizes that adolescents are particularly sensitive to social influences and require guidance to develop self-regulation and motivation.

In the school context, Jacquelynne Eccles and Robert Roeser (2011) argue that the learning environment plays a crucial role in shaping adolescents' academic engagement and achievement. Teachers who are able to create supportive, structured, and motivating environments can significantly enhance students' cognitive outcomes.

Instructional Strategies and Student Motivation

The effectiveness of teaching methodologies is closely linked to student motivation and engagement. Research by Megan Tschannen-Moran and Anita Woolfolk Hoy (2007) suggests that experienced teachers are more likely to demonstrate higher levels of self-efficacy, which in turn positively influences their instructional practices and student outcomes.

In the context of physical education, effective teaching strategies include the use of interactive, student-centered approaches that promote active participation and intrinsic motivation. These strategies are particularly important in overcoming barriers such as lack of facilities, large class sizes, and limited instructional time.

Research Gap

Despite the extensive literature on teacher competence and physical education, there remains a limited number of studies focusing specifically on the role of field experience in shaping the conduct of physical education sessions, particularly within developing or region-specific contexts such as southern Algeria.

Most existing studies emphasize either teacher quality in general or the benefits of physical education, without integrating these dimensions into a comprehensive analytical framework. Therefore, this study contributes to the literature by examining the combined effect of teacher experience, pedagogical practice, and contextual factors on students' cognitive achievement.

Conceptual Definitions

Education

Education is a multidimensional and dynamic process that extends beyond formal schooling environments. It encompasses the development of individuals' cognitive, moral, and social capacities through continuous interaction within various contexts, including the classroom, family, and broader social environment. From a contemporary perspective, education is understood as a lifelong process aimed at fostering individual growth, social integration, and the acquisition of knowledge and skills necessary for active participation in society.

Physical Education and Sports

Physical education is an integral component of general education, designed to promote the holistic development of individuals through structured physical activities. It contributes to the development of physical fitness, cognitive abilities, emotional regulation, and social skills. As such, it plays a crucial role in achieving balanced and comprehensive growth, particularly during adolescence.

Field Experience

Field experience refers to the practical knowledge and competencies acquired through professional practice in real-life educational settings. It encompasses the ability to apply theoretical knowledge, adapt to diverse situations, and effectively manage teaching and learning processes. Field experience is not merely the accumulation of years in service but reflects the teacher's capacity to integrate knowledge, skills, and pedagogical judgment in addressing complex classroom dynamics.

Concept of Competence

From a terminological perspective, competence is defined as an effective capacity to act in complex and dynamic situations through the mobilization and appropriate application of knowledge and skills. According to Philippe Perrenoud, competence is not limited to the possession of theoretical knowledge but involves the ability to use such knowledge strategically and contextually to identify real-world problems and implement appropriate solutions. In this sense, competence reflects a dynamic integration of cognitive, practical, and reflective dimensions of professional practice.

Furthermore, competence is considered a formative objective that requires the integration of prior learning experiences rather than their mere accumulation. It emphasizes the development of adaptive expertise, enabling individuals to respond effectively to diverse and evolving situations within educational contexts (Hamotte, 2005).

Physical Education and Sports Teacher

From a pedagogical perspective, the physical education and sports teacher is conceptualized as a professional who operates across multiple domains of learning, including the cognitive, affective, and psychomotor domains. According to Al-Luqani and Al-Jamal, the teacher is an individual capable of facilitating various levels of learning outcomes, ranging from knowledge acquisition and comprehension to higher-order processes such as analysis, synthesis, and evaluation.

In this context, the physical education teacher is not merely an instructor of physical activities but a comprehensive educator who contributes to students' intellectual, emotional, and social development. This role requires a commitment to professional practice, participation in cultural and educational development, and active engagement in achieving broader educational objectives.

Similarly, Al-Khouli emphasizes that the preparation of physical education teachers should aim at developing well-rounded professionals who possess strong academic knowledge, pedagogical competence, and leadership skills within the field of sports education. Such preparation enables teachers to function effectively as educators, mentors, and facilitators of student development.

Adolescence

Adolescence is defined as a critical developmental stage that begins with the onset of puberty and extends to full physical, psychological, and social maturity. It is characterized by significant transformations across multiple dimensions, including cognitive development, emotional regulation, identity formation, and social interaction.

In the context of this study, adolescence refers to students aged approximately 13 to 18 years, corresponding to the middle and secondary school levels. This stage is particularly sensitive, as individuals experience rapid changes that may influence their behavior, academic performance, and social integration. Consequently, the role of educators—especially physical education teachers—is crucial in guiding students through this transitional phase and supporting their holistic development.

Research Methodology

Research Design

This study adopts a descriptive-analytical research design, which is widely used in educational and social sciences to examine relationships between variables and interpret observed phenomena. The descriptive approach goes beyond the mere collection of data, aiming to analyze, interpret, and derive meaningful conclusions that can contribute to a deeper understanding of the research problem (Shafik, 1998).

Similarly, the descriptive method is defined as a systematic process of analysis and interpretation conducted to achieve specific research objectives related to a particular social or educational issue (Bouhouch & Dnibat, 1995). This approach is particularly suitable for the present study, as it allows for the examination of the relationship between teachers' field experience and the effectiveness of educational session conduct.

Exploratory Phase

Prior to the main data collection, an exploratory phase was conducted to refine the research problem and identify key variables. This phase involved reviewing relevant literature and conducting preliminary field observations. A field visit was carried out at Suaidani Boujemaa Middle School in the Wilaya of Tamanrasset to gain practical insights into the educational environment and to validate the research instrument.

This exploratory stage contributed to:

- Clarifying the research questions
- Identifying the study variables
- Designing the questionnaire
- Defining the research population

Research Population and Sample

The research population refers to the entire group of individuals relevant to the study's objectives. It must include all categories related to the research problem while avoiding duplication or sampling bias (Shafie & Ali, n.d.).

In this study, the research population consists of physical education and sports teachers working in middle schools in the Wilaya of Tamanrasset. A sample of 30 teachers was selected to participate in the study. Although relatively limited in size, the sample is considered appropriate for a descriptive-analytical study focusing on a specific regional context.

Research Variables

The study is based on the analysis of two main variables:

Independent Variable

- Field experience of physical education teachers, defined as the level of practical experience, professional exposure, and pedagogical competence acquired through teaching practice.

Dependent Variable

- Conduct of the educational session, referring to the effectiveness, organization, and quality of physical education lesson delivery, including student engagement, classroom management, and instructional outcomes.

Research Instrument

The primary data collection instrument employed in this study was a structured questionnaire, designed to capture teachers' perceptions and practices regarding the role of field experience in the conduct of physical education sessions. The questionnaire consisted of a combination of open-ended and closed-ended questions, allowing for both quantitative measurement and qualitative insights.

The instrument was organized into several thematic sections aligned with the study's research hypotheses and objectives. Closed-ended questions facilitated statistical analysis, while open-ended questions provided deeper understanding of teachers' perspectives. The questionnaire was administered directly to participants, with clarification provided where necessary to ensure the accuracy and consistency of responses.

Research Scope

Spatial Scope

The study was conducted in several middle schools located in the Wilaya of Tamanrasset, southern Algeria, including Suaidani Boujemaa Middle School. This regional focus allows for the examination of educational practices within a specific socio-cultural and institutional context.

Temporal Scope

Data collection was carried out over a defined period extending from April 2015 to May 2015, ensuring temporal consistency in the responses and minimizing external variations.

Statistical Methods

The purpose of statistical analysis in this study is to generate quantitative indicators with statistical significance, enabling the systematic examination of relationships between variables and the validation of research hypotheses. Statistical methods were selected based on their suitability for descriptive and inferential analysis within the study's design.

The following statistical techniques were employed:

1. Percentage Analysis

Percentage analysis was used to describe the distribution of responses across different categories. This method provides a clear representation of the relative proportions of responses within the sample.

Formula:

$$\text{Percentage} = \frac{\text{Frequency} \times 100}{\text{Total Sample Size}}$$

2. Pearson Correlation Coefficient (r)

The Pearson correlation coefficient was used to measure the strength and direction of the relationship between variables, particularly in assessing the association between teachers' field experience and the effectiveness of session conduct.

Formula:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

3. Chi-Square Test (χ^2)

The Chi-square (χ^2) test was applied to examine whether observed differences in response frequencies are statistically significant or occurred by chance. This test is particularly useful for categorical data and hypothesis testing in social science research.

Formula:

$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

Where:

- O= Observed frequency
- E= Expected frequency

Analysis and Discussion of Teachers' Questionnaire Results

Question 1

Do you consider physical education classes at the middle/secondary school level to be primarily:

- Educational
- Cognitive
- Recreational

Purpose of the Question

This question aims to assess teachers' perceptions of the fundamental role and function of physical education within the educational system.

Analytical Perspective (Q1-Level Interpretation)

This question serves as a foundational indicator of how physical education is conceptualized by practitioners. Understanding whether teachers perceive physical education as primarily educational, cognitive, or recreational provides critical insight into their pedagogical orientation and instructional priorities.

From a theoretical perspective, contemporary educational frameworks emphasize the multidimensional nature of physical education, integrating cognitive, affective, and psychomotor domains. Therefore, the dominance of one category over others may reflect underlying pedagogical biases or systemic constraints within the educational environment.

The results of this question will contribute to evaluating whether teachers' perceptions align with modern educational theories that advocate for a holistic approach to physical education.

Purpose of Question 1: To determine the perceived importance of the physical education class according to high school PE teachers.

Table 1 shows frequencies, percentages, and Chi-Square values for **Question 1**

Question	Answer	Frequency	Percentage
	Yes	20	66.66%
	Sometimes	09	30%
	No	01	3.33%
Total		30	100%

Calculated Chi-Square	Tabulated Chi-Square	Significance Level	Degrees of Freedom	Significance
18.2	5.99	0.05	2	Significant

Question 1

Analysis

The results presented in Table 1 indicate that a substantial majority of respondents (66.66%) perceive physical education (PE) classes as primarily educational in nature. In contrast, 30% of the participants identified PE as mainly recreational, while a marginal proportion (3.33%) considered it primarily informative or cognitive.

To assess the statistical significance of these differences, the Chi-square (χ^2) test was applied. The calculated χ^2 value (18.2) exceeds the critical (tabulated) value (5.99) at a significance level of $\alpha = 0.05$ with 2 degrees of freedom. This result indicates that the observed distribution of responses is statistically significant, confirming that the predominance of the "educational" perception is not due to random variation.

From an analytical perspective, these findings suggest that teachers conceptualize physical education beyond its traditional recreational function, recognizing its broader pedagogical value within the educational system. This aligns with contemporary educational frameworks that position physical education as an integral component of holistic student development, encompassing cognitive, social, and behavioral dimensions.

Conclusion

Based on these findings, it can be concluded that physical education is predominantly perceived by teachers as an educational discipline, rather than merely a recreational or auxiliary activity. This perception reflects a shift toward recognizing the instructional and developmental significance of physical education within the broader educational process.

Question 2

Research Question

What are the main factors that hinder the effective conduct of physical education classes?

- Lack of facilities
- Large number of students
- Limited class time

Purpose of the Question

This question aims to identify the structural and contextual barriers that affect the quality and effectiveness of physical education sessions from the perspective of teachers. Understanding these constraints is essential for evaluating the conditions under which physical education is delivered and for identifying potential areas for institutional improvement.

Analytical Perspective

The identification of constraints such as insufficient facilities, overcrowded classrooms, and limited instructional time highlights the importance of institutional and environmental factors in shaping teaching effectiveness. While teacher competence and experience are critical determinants of educational quality, these factors operate within a broader structural context that may either facilitate or hinder effective lesson delivery.

In this regard, the analysis of Question 2 contributes to a more comprehensive understanding of the interaction between teacher-related variables (e.g., experience, competence) and contextual variables (e.g., infrastructure, class size, time allocation). This multidimensional perspective is essential for interpreting the overall effectiveness of physical education sessions and for situating the role of field experience within a realistic educational environment.

Table 2 shows the frequencies, percentages, and Chi-square (χ^2) values for Question 2:

Question	Answer	Total	Calculated \chi^2	Tabulated \chi^2	Sig. Level	DF	Significance
Q2	Facility shortage	Student density	Time allocated	30	10.4	5.99	0.05
Freq.	18	08	04				
Perc.	60%	26.66%	13.33%	100%			

Question 2

Analysis

The results presented in Table 2 indicate that the **lack of sports facilities** represents the most significant barrier to the effective conduct of physical education sessions, as reported by **60%** of the respondents. In comparison, **26.66%** of the participants identified the **large number of students (class size)** as a key constraint, while **13.33%** highlighted the **limited instructional time** allocated to physical education sessions.

To assess the statistical significance of these differences, the Chi-square (χ^2) test was applied. The calculated χ^2 value (**10.4**) exceeds the critical value (**5.99**) at a significance level of $\alpha = 0.05$ with **2 degrees of freedom**, indicating that the observed differences in responses are **statistically significant**. This confirms that the predominance of "lack of facilities" as the primary constraint is not due to chance.

From an analytical standpoint, these findings underscore the critical role of **institutional and infrastructural conditions** in shaping the effectiveness of physical education. While teacher competence and field experience are essential for delivering high-quality instruction, their impact is significantly constrained by inadequate physical resources. The absence of appropriate facilities limits the implementation of practical activities, reduces student engagement, and restricts the diversity of pedagogical approaches available to teachers.

Furthermore, the identification of class size and time allocation as secondary constraints reflects broader systemic challenges within the educational environment. Overcrowded classes can hinder individualized instruction and effective classroom management, while insufficient time allocation reduces opportunities for skill development and meaningful student participation.

Conclusion

Based on these findings, it can be concluded that structural and infrastructural limitations—particularly the lack of adequate sports facilities—constitute the primary obstacle to the effective delivery of physical education sessions. Addressing these challenges requires institutional investment in educational infrastructure, as well as policy-level interventions aimed at improving learning conditions.

Question 3

Research Question

If physical education sessions cannot be conducted due to weather conditions, how do teachers respond?

- Conduct theoretical lessons
- Cancel the session
- Implement alternative activities

Purpose of the Question

This question aims to examine teachers' adaptive strategies and pedagogical flexibility in response to external environmental constraints, such as adverse weather conditions. It provides insight into how teachers maintain instructional continuity and ensure learning outcomes despite disruptions to practical activities.

Analytical Perspective

The responses to this question are critical for understanding the extent to which teachers are able to adapt their instructional practices in challenging conditions. The reliance on theoretical lessons or alternative activities may reflect both the level of teacher preparedness and the availability of institutional support.

From a pedagogical perspective, the ability to shift from practical to theoretical instruction demonstrates instructional adaptability, which is a key component of professional competence. However, frequent reliance on theoretical sessions

may also indicate underlying infrastructural limitations, such as the absence of indoor facilities, which constrain the implementation of physical activities.

Thus, the analysis of this question contributes to a broader understanding of how external environmental factors interact with teacher competence and institutional conditions to influence the effectiveness of physical education sessions.

Table 3 shows the frequencies, percentages, and Chi-square (χ^2) values.

estion	Answer	Total	Calculated \chi^2	Tabulated \chi^2	Sig. Level	DF	Significance
Q3	Theoretical lessons	Session cancellation	Something else	30	21.8	5.99	0.05
Freq.	22	03	05				
Perc.	73.33%	10%	16.6%	≈100%			

Question 3

Analysis

The results presented in Table 3 indicate that a substantial majority of respondents (**73.33%**) reported that, when unable to conduct practical physical education (P.E.) sessions due to adverse climatic conditions, they resort to delivering theoretical lessons. In contrast, 16.6% of the respondents indicated that they implement alternative activities, while a smaller proportion (10%) reported that they cancel the session entirely.

To evaluate the statistical significance of these differences, the Chi-square (χ^2) test was applied. The calculated χ^2 value (21.8) significantly exceeds the critical value (5.99) at a significance level of $\alpha = 0.05$ with 2 degrees of freedom, indicating that the observed variation in responses is statistically significant. This confirms that the reliance on theoretical instruction is the dominant and consistent practice among teachers under such conditions.

From an analytical perspective, these findings reflect a relatively high level of instructional adaptability, as most teachers seek to maintain continuity in the learning process despite environmental constraints. The preference for theoretical lessons suggests that teachers attempt to compensate for the absence of practical activities by focusing on cognitive and conceptual aspects of physical education, such as rules, strategies, and health-related knowledge.

However, the limited use of alternative pedagogical activities—such as modified indoor exercises or interactive learning strategies—may indicate constraints related to infrastructure, lack of resources, or insufficient training in adaptive teaching methods. Similarly, the decision by some teachers to cancel sessions highlights the persistence of structural limitations that hinder the effective delivery of physical education under challenging conditions.

Conclusion

Based on these findings, it can be concluded that theoretical instruction constitutes the primary adaptive strategy employed by physical education teachers when practical sessions cannot be conducted due to climatic factors. While this approach ensures instructional continuity, it also underscores the need for improved infrastructural support and professional training to diversify teaching strategies in non-ideal conditions.

Question 4

Research Question

In your opinion, what best defines the concept of field experience?

- A set of organized abilities
- A set of knowledge and skills
- The ability to apply personal skills and knowledge

Purpose of the Question

This question aims to assess teachers' conceptual understanding of field experience, which represents a key variable in the study. By examining how teachers define this concept, the study seeks to evaluate whether their perceptions align with contemporary pedagogical theories that emphasize the integration of knowledge, skills, and practical application.

Analytical Perspective

Understanding how teachers conceptualize field experience is essential for interpreting its role in educational practice. In modern educational theory, field experience is not merely associated with accumulated knowledge or isolated skills but is understood as the **capacity to mobilize and apply competencies effectively in real-world teaching situations**.

Therefore, teachers' responses to this question provide insight into their level of professional awareness and pedagogical orientation. A tendency to define field experience in terms of application and integration may reflect a more advanced and practice-oriented understanding, whereas more limited definitions may indicate a narrower perception of professional competence.

Table 4 represents the frequencies, percentages, and Chi-square (χ^2) values (Question 4).

Question	Answer	Total	Calculated \chi^2	Tabulated \chi^2	Sig. Level	DF	Significance
Q4	Set of abilities	Knowledge and skills	Use of skills and knowledge	30	21.8	5.99	0.05
Freq.	03	05	22				
Perc.	10%	16.66%	73.33%	≈100%			

Question 4

Analysis

The results presented in Table 4 indicate that a clear majority of respondents (73.33%) conceptualize field experience as the ability to effectively apply personal skills and knowledge in practical teaching situations. In contrast, 16.66% of the participants defined field experience as a set of knowledge and skills, while a smaller proportion (10%) perceived it as a set of organized abilities.

To assess the statistical significance of these differences, the Chi-square (χ^2) test was conducted. The calculated χ^2 value (21.8) exceeds the critical value (5.99) at a significance level of $\alpha = 0.05$ with 2 degrees of freedom, indicating that the observed variation in responses is statistically significant. This confirms the predominance of the perception that field experience is fundamentally linked to the practical application of competencies.

From a theoretical perspective, this finding aligns with contemporary educational frameworks, which define professional competence not merely as the accumulation of knowledge but as the capacity to mobilize and apply knowledge, skills, and experience in real-world contexts. The dominance of this response suggests that teachers possess a relatively advanced and practice-oriented understanding of field experience, emphasizing its functional and applied dimension rather than its purely theoretical aspects.

Conclusion

Based on these findings, it can be concluded that physical education teachers predominantly perceive field experience as the practical application of knowledge and skills in teaching contexts. This perception reflects an understanding consistent with modern pedagogical theories, which emphasize the integration and contextual use of competencies as a core component of professional expertise.

Question 5

Research Question

Do you consider the absence of field experience among physical education teachers to be an obstacle to students' understanding and comprehension of the implemented program?

- Yes
- No

Purpose of the Question

This question aims to evaluate teachers' perceptions of the importance of field experience as a determinant of instructional effectiveness, particularly in relation to students' ability to understand and engage with the curriculum. It directly addresses the central research variable by examining whether a lack of experience is perceived as a barrier to effective teaching and learning.

Analytical Perspective

The responses to this question provide critical insight into the perceived relationship between teacher competence and student learning outcomes. If the majority of respondents consider the absence of field experience to be an obstacle, this

would reinforce the argument that professional experience plays a central role in facilitating effective knowledge transmission, classroom management, and student comprehension.

From an educational perspective, field experience enhances teachers' ability to:

- Adapt instructional strategies to students' needs
- Manage classroom dynamics effectively
- Provide clear and contextually relevant explanations

Thus, the analysis of this question contributes to validating the study's core hypothesis regarding the significant impact of teacher experience on the quality of educational sessions.

Question	Answer	Total	Calculated \chi^2	Tabulated \chi^2	Sig. Level	DF	Significance
Q5	Yes	No	30	19.2	3.841	0.05	1
Freq.	27	03					
Perc.	90%	10%	100%				

Question 5

Analysis

The results presented in Table 5 reveal that a substantial majority of respondents (90%) perceive the absence of field experience among physical education teachers as a significant obstacle to students' understanding and comprehension of the implemented curriculum. In contrast, only 10% of the participants indicated that they do not consider the lack of experience to be a limiting factor.

To determine the statistical significance of this distribution, the Chi-square (χ^2) test was applied. The calculated χ^2 value (19.2) exceeds the critical value (3.84) at a significance level of $\alpha = 0.05$ with 1 degree of freedom, indicating that the observed difference in responses is highly statistically significant. This confirms that the perception of field experience as a critical determinant of student comprehension is not due to chance but reflects a consistent and dominant view among teachers.

From an analytical perspective, these findings strongly support the central premise of the study, highlighting the crucial role of professional experience in enhancing teaching effectiveness and facilitating student learning. Field experience enables teachers to adapt instructional strategies, simplify complex concepts, and respond effectively to students' diverse learning needs. In its absence, teachers may struggle to translate theoretical knowledge into practical and accessible forms, thereby limiting students' ability to fully engage with and comprehend the curriculum.

Moreover, this result underscores the importance of experiential knowledge as a component of pedagogical competence, reinforcing theoretical frameworks that emphasize the integration of knowledge, skills, and practice in effective teaching. The findings also suggest that educational systems should prioritize the development of teachers' practical experience through continuous training and professional development programs.

Conclusion

Based on these findings, it can be concluded that the absence of field experience among physical education teachers constitutes a significant barrier to students' understanding and comprehension of educational programs. This highlights the need to strengthen teacher preparation and ongoing professional development to improve instructional quality and learning outcomes.

Question 6

Research Question

Do you believe that the teaching methodology you use encourages students to exert their maximum effort during physical education sessions?

Purpose of the Question

This question aims to assess teachers' perceptions of the effectiveness of their pedagogical approaches in motivating students and enhancing their engagement during physical education sessions. It is closely related to the concept of teaching quality and its impact on student participation and performance.

Analytical Perspective

The responses to this question provide insight into the relationship between teaching methodology and student motivation, which is a critical factor in educational effectiveness. A teaching methodology that encourages active participation, engagement, and effort reflects a higher level of pedagogical competence and adaptability.

From a theoretical standpoint, student motivation is influenced by instructional strategies that promote autonomy, interaction, and meaningful learning experiences. Therefore, analyzing teachers' perceptions of their methodologies contributes to understanding how instructional practices shape students' willingness to engage and perform during physical education sessions.

Analysis and Interpretation of Results

Question 6: Effectiveness of Teaching Methodology

Table 6. Teachers' Perceptions of Methodological Effectiveness

Response	Frequency	Percentage
Yes	28	93.3%
No	2	6.66%
Total	30	100%

Statistical Test: $\chi^2 = 22.53 > 3.84$ ($\alpha = 0.05$; df = 1) → Statistically Significant

Analysis

The results presented in Table 6 indicate that a substantial majority of respondents (93.3%) believe that the teaching methodologies they employ effectively encourage students to exert maximum effort during physical education sessions. In contrast, only a small proportion (6.66%) expressed disagreement.

The Chi-square (χ^2) test confirms the statistical significance of this distribution, as the calculated value (22.53) exceeds the critical value (3.84) at a significance level of $\alpha = 0.05$ with 1 degree of freedom. This demonstrates that the predominance of positive responses is not due to chance, but reflects a consistent perception among teachers.

From an analytical perspective, these findings highlight the importance of instructional methodology as a key determinant of student motivation and engagement. Effective teaching strategies—particularly those that are interactive, student-centered, and adaptive—are likely to foster greater participation and effort among students. This is consistent with contemporary educational theories that emphasize the role of pedagogy in enhancing intrinsic motivation and learning outcomes.

However, it is important to note that this result reflects teachers' self-perceptions, which may not fully capture students' actual experiences. Therefore, while the findings suggest a strong level of confidence in teaching methodologies, further investigation incorporating student perspectives would provide a more comprehensive evaluation.

Conclusion

It can be concluded that the majority of physical education teachers perceive their teaching methodologies as effective in motivating students to perform at their best. This underscores the central role of pedagogical strategies in shaping student engagement and effort during physical education sessions.

Question 7: Integration of Field Experience in Teaching

Table 7. Use of Field Experience During Instruction

Response	Frequency	Percentage
Yes	25	83.33%
No	5	16.66%
Total	30	100%

Statistical Test: $\chi^2 = 13.33 > 3.84$ ($\alpha = 0.05$; df = 1) → Statistically Significant

Analysis

The findings presented in Table 7 indicate that a large majority of respondents (83.33%) report that they actively incorporate and demonstrate their field experience during the implementation of the physical education curriculum.

Meanwhile, 16.66% of teachers indicated that they do not explicitly emphasize their field experience in instructional practice.

The Chi-square (χ^2) test confirms that this distribution is statistically significant, as the calculated value (13.33) exceeds the critical value (3.84) at a significance level of $\alpha = 0.05$ with 1 degree of freedom. This suggests that the integration of field experience into teaching practices is a dominant and consistent trend among respondents.

From a theoretical perspective, this result reinforces the importance of experiential knowledge as a central component of teaching competence. Teachers who draw upon their practical experience are more likely to deliver contextually relevant instruction, adapt to classroom challenges, and provide meaningful learning experiences for students.

Furthermore, the demonstration of field experience may serve as a motivational and instructional tool, allowing students to connect theoretical knowledge with real-world applications. This is particularly relevant in physical education, where effective learning depends on the integration of cognitive understanding and practical performance.

Conclusion

It can be concluded that most physical education teachers actively integrate their field experience into instructional practice, contributing to the enhancement of teaching quality and student learning outcomes. However, this represents a predominant tendency rather than a universal practice, highlighting the need for continued professional development among educators.

Analysis

The results presented in Table 7 indicate that a substantial majority of respondents (83.33%) reported that they consciously demonstrate and utilize their field experience during the implementation of the physical education curriculum. In contrast, 16.66% of the participants indicated that they do not explicitly incorporate their field experience in the instructional process.

To assess the statistical significance of this distribution, the Chi-square (χ^2) test was applied. The calculated χ^2 value (13.33) exceeds the critical value (3.84) at a significance level of $\alpha = 0.05$ with 1 degree of freedom, indicating that the observed differences in responses are statistically significant. This confirms that the tendency of teachers to integrate their field experience into teaching practices is not due to random variation but represents a dominant and consistent pattern.

From an analytical perspective, these findings highlight the importance of experiential knowledge as a core component of pedagogical practice. Teachers who actively draw upon their field experience are more likely to deliver instruction that is contextually relevant, adaptive, and responsive to students' needs. This integration enhances the quality of lesson delivery, facilitates clearer communication of concepts, and supports more effective classroom management.

Moreover, the emphasis on demonstrating field experience reflects a practice-oriented teaching approach, which aligns with contemporary educational theories that prioritize the application of knowledge over its mere transmission. Such an approach is particularly valuable in physical education, where learning outcomes depend on both cognitive understanding and practical engagement.

Conclusion

Based on these findings, it can be concluded that the majority of physical education teachers actively incorporate their field experience into the implementation of teaching programs, thereby enhancing the effectiveness of instructional practices. However, it is more accurate to state that this reflects a predominant tendency among respondents, rather than a universal behavior across all teachers.

Question 8

Research Question

On what basis do teachers assess students' performance in physical education?

- Cognitive tests
- Practical tests
- Other forms of assessment

Purpose of the Question

This question aims to identify the evaluation criteria and assessment strategies employed by physical education teachers. It provides insight into whether assessment practices emphasize cognitive knowledge, practical performance, or a combination of both.

Analytical Perspective

Assessment practices in physical education are a critical component of the teaching–learning process, as they reflect teachers' pedagogical priorities and influence students' engagement and performance. A focus on practical assessment indicates an emphasis on skill acquisition and physical performance, whereas cognitive assessment highlights theoretical understanding.

From a contemporary educational perspective, effective assessment in physical education should adopt a holistic approach, integrating cognitive, psychomotor, and affective dimensions. Therefore, analyzing teachers' assessment practices contributes to understanding the extent to which current evaluation methods align with modern pedagogical frameworks.

Question 8: Assessment Methods in Physical Education

Table 8. Distribution of Assessment Methods

Assessment Type	Frequency	Percentage
Cognitive Tests	1	3.33%
Practical Tests	29	96.66%
Other Tests	0	0%
Total	30	100%

Statistical Test: $\chi^2 = 54.2 > 5.99$ ($\alpha = 0.05$; df = 2) → Statistically Significant

Analysis

The results presented in Table 8 demonstrate that an overwhelming majority of respondents (96.66%) rely on practical tests to assess students' performance in physical education, while only a marginal proportion (3.33%) use cognitive-based assessments.

The Chi-square (χ^2) test confirms the statistical significance of this distribution, as the calculated value (54.2) substantially exceeds the critical value (5.99) at a significance level of $\alpha = 0.05$ with 2 degrees of freedom. This indicates that the dominance of practical assessment methods is not due to random variation but reflects a clear and consistent evaluative pattern.

From an analytical perspective, these findings suggest that teachers prioritize the psychomotor domain of learning, emphasizing performance-based evaluation over cognitive assessment. While this aligns with the practical nature of physical education, it may also indicate a limited integration of cognitive evaluation, which is essential in modern pedagogical frameworks advocating a holistic approach to assessment.

Conclusion

It can be concluded that physical education teachers predominantly rely on practical assessment methods, reflecting a strong orientation toward performance-based evaluation, with limited emphasis on cognitive or alternative forms of assessment.

Question 9: Training for Working with Adolescents

Table 9. Training Experience of Teachers

Response	Frequency	Percentage
Yes	24	80%
No	6	20%
Total	30	100%

Statistical Test: $\chi^2 = 10.8 > 3.84$ ($\alpha = 0.05$; df = 1) → Statistically Significant

Analysis

The findings indicate that a substantial majority of respondents (80%) have received specialized training to work with adolescents, while 20% reported no such training. The Chi-square test confirms the statistical significance of this difference, suggesting that training is a dominant characteristic among the sample.

This result highlights the growing recognition of adolescence as a critical developmental stage requiring specialized pedagogical approaches. Teachers with such training are more likely to demonstrate adaptive teaching practices, emotional sensitivity, and effective classroom management strategies.

Conclusion

The majority of physical education teachers have received training to work with adolescents, which likely enhances their ability to address students' developmental and educational needs effectively.

Question 10: Causes of Limited Teacher Initiative

Table 10. Perceived Causes of Limited Initiative

Cause	Frequency	Percentage
Lack of Competence	11	36.66%
Indifference	14	46.66%
Other Factors	5	16.66%
Total	30	100%

Statistical Test: $\chi^2 = 4.2 < 5.99$ ($\alpha = 0.05$; df = 2) → Not Statistically Significant

Analysis

The results indicate that indifference (46.66%) is the most frequently cited factor, followed by lack of competence (36.66%), and other reasons (16.66%). However, the Chi-square test reveals that the calculated value (4.2) is lower than the critical value (5.99), indicating that these differences are not statistically significant.

This suggests that there is no dominant consensus among teachers regarding the primary cause of limited initiative. The distribution reflects a multifactorial explanation, where both personal (motivation, attitudes) and professional (competence, training) factors may interact.

Conclusion

The lack of initiative among teachers cannot be attributed to a single dominant factor; rather, it reflects a combination of attitudinal and professional variables.

Question 11: Consideration of Individual Differences

Table 11. Attention to Individual Differences

Response	Frequency	Percentage
Yes	26	86.66%
No	4	13.33%
Total	30	100%

Statistical Test: $\chi^2 = 16.13 > 3.84$ ($\alpha = 0.05$; df = 1) → Statistically Significant

Analysis

A large majority of respondents (86.66%) reported that they take individual differences into account during physical education sessions. The Chi-square test confirms that this pattern is statistically significant.

This finding reflects a high level of pedagogical awareness, as recognizing individual differences is essential for inclusive and effective teaching. It also suggests that teachers are adopting student-centered approaches, adjusting instruction to accommodate diverse abilities and needs.

Conclusion

Most teachers demonstrate awareness of individual differences, indicating alignment with modern inclusive teaching practices.

Question 12: Role of Field Experience in Pedagogical Relationships

Table 12. Perceived Role of Field Experience

Response	Frequency	Percentage
Yes	30	100%
No	0	0%
Total	30	100%

Analysis

All respondents (100%) agreed that field experience plays a significant role in strengthening the pedagogical relationship between teachers and students. Although no statistical test is required due to the uniformity of responses, the result clearly indicates a strong consensus.

This finding reinforces the central premise of the study, emphasizing that field experience enhances teachers' ability to build effective, supportive, and interactive relationships with students.

Conclusion

Field experience is universally perceived as a critical factor in improving teacher–student relationships.

Question 13: Consideration of Psychological and Social Conditions

Table 13. Consideration of Students' Conditions

Response	Frequency	Percentage
Yes	28	93.66%
No	2	6.66%
Total	30	100%

Statistical Test: $\chi^2 = 22.53 > 3.84$ ($\alpha = 0.05$; df = 1) → Statistically Significant

Analysis

The results indicate that a vast majority (93.66%) of teachers consider the psychological and social conditions of adolescents during physical education sessions. The Chi-square test confirms the statistical significance of this finding.

This reflects a strong level of professional and pedagogical maturity, as attention to students' socio-emotional context is essential for effective teaching, particularly during adolescence.

Conclusion

Teachers demonstrate a high level of awareness regarding students' psychological and social needs, contributing to a supportive and effective learning environment.

Discussion and Interpretation of Results

Analysis of Teachers' Perceptions (Table 13)

The results presented in Table 13 indicate that an overwhelming majority of respondents (93.66%) reported that they take into account the psychological and social conditions of adolescents when conducting physical education sessions, while only a marginal proportion (3.84%) indicated otherwise. The Chi-square (χ^2) test confirms the statistical significance of this distribution, with a calculated value (22.53) exceeding the critical value (3.84) at a significance level of $\alpha = 0.05$ with 1 degree of freedom.

This finding reflects a high level of pedagogical awareness among teachers, demonstrating their recognition of adolescence as a sensitive developmental stage requiring adaptive teaching strategies. It also suggests that teachers actively integrate socio-emotional considerations into their instructional practices, which is essential for fostering effective learning environments and promoting student engagement.

Discussion of Results in Light of the First Sub-Hypothesis

The first sub-hypothesis posited that students' cognitive achievement is influenced by the competence and abilities of physical education teachers. The empirical findings provide strong support for this assumption.

Data derived from both teachers' and students' questionnaires indicate that teachers' pedagogical competence—particularly their ability to implement effective teaching methodologies—plays a critical role in enhancing students' cognitive engagement and academic performance. Teachers reported that their instructional approaches encourage students to exert greater effort during physical education sessions, which is reflected in students' own perceptions of increased motivation and satisfaction.

Moreover, the results highlight that teachers consciously integrate cognitive dimensions into physical education, moving beyond purely physical activities to incorporate elements that stimulate thinking, understanding, and knowledge acquisition. This aligns with contemporary educational theories that emphasize the integration of cognitive, affective, and psychomotor domains in holistic learning processes.

Additionally, the findings suggest that teachers' competence has a direct psychological impact on students. Students perceive physical education teachers as approachable, supportive, and influential role models, which enhances their confidence and willingness to engage in learning. Consequently, the first sub-hypothesis is empirically validated, confirming that teacher competence significantly influences students' cognitive achievement.

Discussion of Results in Light of the Second Sub-Hypothesis

The second sub-hypothesis assumed that adolescents' cognitive achievement is influenced by their engagement in physical education activities. The results provide substantial evidence supporting this assumption.

Teachers reported that their training and professional experience enable them to address the specific needs of adolescents, taking into account their psychological, social, and developmental characteristics. This includes recognizing individual differences in cognitive and physical abilities and adapting instructional strategies accordingly.

Students' responses further reinforce this finding, as many reported that participation in physical education sessions enhances their motivation not only within the subject itself but also across other academic disciplines. This suggests that physical education contributes to the development of transferable skills such as discipline, focus, and self-confidence, which positively influence overall academic performance.

Furthermore, the findings indicate that students attach significant importance to physical education teachers, viewing them as accessible and supportive figures during a critical stage of development. This relationship fosters a positive learning environment that enhances both engagement and cognitive achievement.

Therefore, the second sub-hypothesis is also empirically confirmed, demonstrating that active participation in physical education plays a significant role in shaping adolescents' cognitive development.

Discussion of Results in Light of the General Hypothesis

Based on the confirmation of both sub-hypotheses, the general hypothesis—stating that the competence of physical education teachers positively influences students' cognitive achievement—is strongly supported.

The results reveal a clear and consistent relationship between teacher competence, instructional effectiveness, and student outcomes. This relationship is mediated by multiple factors, including teaching methodology, psychological support, and the ability to adapt to students' developmental needs. Consequently, the findings underscore the importance of teacher competence as a central determinant of educational quality and student success.

General Conclusion

The present study provides a comprehensive analysis of the role of physical education teachers' competence in shaping students' cognitive achievement during adolescence. The findings highlight several key conclusions:

First, teacher competence is a fundamental prerequisite for effective learning, as students' ability to acquire and apply knowledge is significantly enhanced when guided by experienced and skilled educators.

Second, physical education teachers play a multifaceted role that extends beyond instruction, functioning as mentors, role models, and facilitators of students' cognitive and personal development. Students perceive these teachers as supportive and influential figures, particularly during adolescence.

Third, the personality and pedagogical competence of teachers have a strong motivational impact on students, encouraging them to engage actively in learning and to seek knowledge across various domains.

Fourth, the study emphasizes the importance of integrating cognitive dimensions into physical education, ensuring that students benefit not only physically but also intellectually and socially.

Fifth, physical education serves as a critical educational platform for fostering curiosity, exploration, and self-expression, particularly when conducted under the guidance of competent teachers. It provides a structured environment in which students can develop essential life skills and build confidence.

Finally, the study demonstrates that adolescence represents a crucial stage for cognitive development, during which effective teaching practices can have long-lasting impacts on students' academic and personal trajectories. In this context, physical education—when delivered by competent and experienced teachers—plays a vital role in shaping well-rounded individuals capable of contributing to society.

Practical and Policy Recommendations

Based on the empirical findings and analytical insights of this study, several recommendations can be proposed to enhance the effectiveness of physical education and strengthen its contribution to students' cognitive and personal development:

1. Enhancing the Institutional Status of Physical Education. Educational policymakers should recognize physical education as a core component of the curriculum, rather than a supplementary subject. Strengthening its

institutional status will contribute to improving its pedagogical impact and ensuring its integration within broader educational objectives.

2. Increasing Instructional Time Allocation. Given the significant role of physical education in fostering cognitive, psychological, and social development—particularly during adolescence—it is recommended to increase the number of hours allocated to this subject within school timetables. Extended instructional time would allow for more comprehensive learning experiences and improved student engagement.
3. Promoting Parity with Academic Subjects. Physical education should be granted equal importance alongside other academic disciplines in secondary education. This includes recognition in assessment systems, resource allocation, and institutional support, thereby reinforcing its role in holistic education.
4. Strengthening Monitoring and Professional Supervision. Educational authorities should implement more effective monitoring, evaluation, and inspection mechanisms to ensure the quality of teaching practices. Regular pedagogical supervision can support teachers in adopting innovative methodologies, improving classroom management, and aligning their practices with contemporary educational standards.
5. Continuous Professional Development for Teachers. Special emphasis should be placed on ongoing training and professional development programs aimed at enhancing teachers' pedagogical competence, particularly in adapting teaching strategies to students' developmental needs and integrating cognitive dimensions into physical education.

Future Research Directions

While this study provides valuable insights into the relationship between teacher competence and students' cognitive achievement, several avenues for future research remain open:

- Conducting large-scale quantitative studies to validate and generalize the findings across different regions and educational contexts.
- Exploring the impact of specific teaching methodologies in physical education on student motivation and academic performance.
- Investigating the role of infrastructure and institutional resources as moderating variables in the relationship between teacher competence and educational outcomes.
- Examining the long-term effects of physical education on students' academic trajectories and personal development.

General Conclusion

Physical education represents a multidimensional educational domain that extends beyond physical activity to encompass psychological, social, and cognitive development. Its role within contemporary educational systems has become increasingly significant, particularly in addressing the complex developmental needs of adolescents.

The findings of this study highlight the central role of the physical education teacher as a key agent in the educational process. A teacher who possesses strong professional competence, extensive field experience, and a well-developed pedagogical profile is capable of creating an effective and supportive learning environment. Such a teacher not only facilitates the acquisition of knowledge and skills but also contributes to the development of students' critical thinking, self-confidence, and motivation.

Moreover, the study demonstrates that teacher competence has a direct and measurable impact on students' cognitive achievement, reinforcing the importance of integrating theoretical knowledge with practical experience in teaching practices. Physical education, when delivered effectively, serves as a powerful tool for enhancing students' overall development and preparing them to meet academic and social challenges.

In conclusion, the effectiveness of physical education depends not only on curricular design but also on the quality of teaching and the professional capabilities of educators. Strengthening teacher training, improving institutional support, and recognizing the strategic importance of physical education are essential steps toward achieving a more inclusive, balanced, and effective educational system.

Ethical Considerations

This study was conducted in full compliance with internationally recognized ethical standards for research involving human participants. The research adhered to the ethical principles outlined in the World Medical Association *Declaration of Helsinki* and relevant institutional guidelines.

Participation in the study was voluntary, and all respondents were informed about the purpose, procedures, and confidentiality of the research prior to data collection. Informed consent was obtained from all participants. The

anonymity and confidentiality of respondents were strictly maintained, and no personally identifiable information was collected or disclosed.

Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article. The research was conducted independently, without any commercial or financial relationships that could be construed as a potential conflict of interest.

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Author Contributions

All authors contributed significantly to the conception, design, execution, and writing of this study.

- Conceptualization and study design: Benmessaoud Z., Rekad M.
- Data collection and analysis: Legridi K., Smara M.
- Writing – original draft preparation: Benamara K.
- Writing – review and editing: All authors

All authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request. Due to privacy and ethical considerations, the data are not publicly accessible.

Informed Consent Statement

Informed consent was obtained from all individual participants included in the study.

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AI Use Statement

The authors declare that no artificial intelligence (AI) tools were used in the design, data collection, analysis, or writing of this manuscript.

Ethics Approval

Ethical approval for this study was obtained from the relevant institutional review body, and all procedures were conducted in accordance with established ethical guidelines for educational research.

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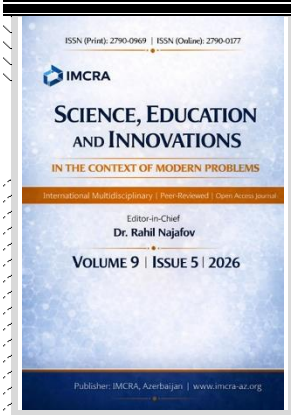
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RESEARCH ARTICLE

Maritime Spatiality and Readerly Engagement in Contemporary Algerian Fiction: A Narratological and Semiotic Analysis of Samia Ben Dris's *Spectra of Scheherazade*

Leila Djoudi

Professor
University of Algiers – 02.
Algeria
E-mail: leila.djoudi@univ-alger.dz

Keywords

Maritime Space; Narrative Aesthetics; Reception Theory; Spatial Narratology; Semiotics of Space; Literary Symbolism; Short Story Analysis; Algerian Literature; Reader Response; Poetics of Space

Abstract

This study presents a comprehensive aesthetic and narratological analysis of maritime space as a central spatial and symbolic construct in Samia Ben Dris's short story *"Light Blue... Dark Blue"*, included in *Spectra of Scheherazade*. Situated at the intersection of spatial literary theory and reception aesthetics, the research examines how the sea transcends its conventional role as a passive setting to function as an active and generative force shaping narrative structure, thematic articulation, and readerly engagement. Employing a qualitative textual analysis, the study conceptualizes the sea as a multidimensional semiotic system that oscillates between material reality and imaginative abstraction, thereby producing a dense and dynamic field of meaning. The findings demonstrate that maritime space operates as a narrative agent that significantly contributes to plot development, character construction, and the formation of emotional and atmospheric depth. At the same time, it facilitates a dialogic interaction between text and reader, enabling an interpretive process grounded in openness and multiplicity. Particular emphasis is placed on the aesthetic strategies through which spatial imagery is constructed, including chromatic symbolism, sensory representation, and anthropomorphic projection. These techniques collectively enhance the narrative's expressive capacity and evoke complex emotional and cognitive responses. The analysis further reveals that the sea embodies a fundamental duality—simultaneously representing harmony and tension, stability and transformation, presence and uncertainty—which reinforces its role as a catalyst for narrative conflict and symbolic production. In addition, the study highlights the significance of narrative techniques such as repetition, descriptive layering, interior monologue, and temporal modulation in consolidating the centrality of space within the narrative discourse. Through these mechanisms, the text generates a cohesive aesthetic experience that actively engages the reader and deepens the process of reception. Ultimately, this research argues that maritime space in Ben Dris's narrative transcends its physical dimension to become a key epistemological and aesthetic framework through which broader concerns related to identity, memory, human experience, and the relationship between nature and narrative are articulated.

Citation

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Introduction

In contemporary literary studies, the concept of space has emerged as a central analytical category, reflecting a significant shift from traditional temporally oriented narratology toward a more spatially conscious understanding of narrative structures. While classical narrative theory privileged time as the primary organizing principle of storytelling, recent theoretical developments have emphasized the active and constitutive role of space in shaping narrative meaning, aesthetic experience, and readerly engagement (Genette, 1980; Bal, 2009). Within this evolving paradigm, space is no longer conceived as a passive container for events but as a dynamic and semiotically charged element that participates in the production of narrative discourse.

Among the various spatial configurations explored in literary texts, maritime space occupies a particularly complex and multifaceted position. The sea, as both a physical and symbolic entity, embodies a rich spectrum of meanings that traverse cultural, psychological, and existential dimensions. It simultaneously represents openness and confinement, continuity and rupture, life and death, thereby offering a fertile ground for literary exploration. As Bachelard (1994) suggests in his seminal work on the poetics of space, natural elements such as water possess profound imaginative and emotional resonance, functioning as catalysts for memory, identity, and creative expression. In narrative contexts, the sea often transcends its material reality to become a symbolic and aesthetic construct that shapes the trajectory of events and the inner worlds of characters.

In parallel, the development of reception theory has further transformed the analytical landscape of literary studies by foregrounding the role of the reader in the construction of meaning. According to Iser (1978), literary texts are inherently indeterminate structures that require active interpretation, while Jauss (1982) emphasizes the historical variability of reader responses. Within this framework, spatial representation plays a crucial role in mediating the interaction between text and reader, providing a site where imagination, perception, and interpretation converge. The sea, with its fluidity and ambiguity, is particularly suited to this function, as it invites multiple readings and facilitates a dynamic process of meaning-making.

Despite the growing body of research on spatial narratology and reception aesthetics, the specific role of maritime space in shaping narrative discourse remains underexplored, particularly within the context of contemporary Algerian literature. Existing studies have often addressed space in descriptive or thematic terms, without fully integrating the theoretical insights of narratology, semiotics, and reader-response criticism. This gap is especially evident in analyses of short narrative forms, where spatial elements are frequently treated as secondary to plot and character, rather than as central organizing principles.

Against this background, the present study aims to provide a comprehensive aesthetic and narratological analysis of maritime space in the short story "Light Blue... Dark Blue," included in *Spectra of Scheherazade* by Samia Ben Dris. The research investigates how the sea functions as an active narrative agent, a semiotic system, and an aesthetic framework that shapes both textual structure and readerly reception. By employing a qualitative analytical approach grounded in spatial narratology and reception theory, the study seeks to elucidate the mechanisms through which maritime space contributes to the construction of meaning, the development of narrative dynamics, and the engagement of the reader.

The significance of this research lies in its attempt to bridge theoretical and textual analysis, offering a multidimensional perspective on the role of space in literature. By situating the analysis within an interdisciplinary framework that integrates narratology, semiotics, and reception studies, the study contributes to ongoing debates on the nature of narrative space and its implications for literary interpretation. Furthermore, it highlights the importance of examining regional literary traditions—such as Algerian narrative fiction—within a global theoretical context, thereby enriching our understanding of the diversity and complexity of contemporary literary production.

Literature Review

The study of space in narrative discourse has evolved into a central domain within contemporary literary theory, particularly with the emergence of spatial narratology and geocritical approaches. Traditionally, narrative analysis prioritized temporal structures; however, modern scholarship has increasingly emphasized the role of space as an active and constitutive element in meaning-making processes (Genette, 1980; Bal, 2009). Within this paradigm shift, space is no longer perceived as a passive backdrop but as a dynamic semiotic system that shapes narrative structure, character development, and readerly interpretation.

One of the foundational contributions to the study of literary space is offered by Gaston Bachelard (1994), whose concept of the *poetics of space* foregrounds the intimate, psychological, and phenomenological dimensions of spatial representation. Bachelard argues that spaces—whether real or imagined—function as repositories of memory, emotion, and identity, thereby enabling literature to transcend physical boundaries and engage with deeper

existential concerns. This perspective is particularly relevant in the analysis of maritime space, which embodies both material and symbolic dimensions, oscillating between stability and fluidity, presence and absence.

Complementing this phenomenological approach, semiotic theorists such as Lotman (1990) conceptualize space as a structured system of signs, embedded within cultural codes and interpretive frameworks. In this context, spatial elements operate as carriers of meaning, interacting with narrative components to produce multilayered interpretations. Similarly, Westphal (2011) and Tally (2013) emphasize the interdisciplinary nature of spatial analysis, integrating literary studies with geography, philosophy, and cultural theory to explore the complex relationship between real and fictional spaces.

Reception theory further expands the analytical scope by shifting attention from the text itself to the reader's role in constructing meaning. Iser (1978) posits that literary texts are inherently indeterminate, requiring active participation from the reader to actualize their potential meanings. Jauss (1982) similarly highlights the historical and cultural variability of reader responses, arguing that interpretation is shaped by evolving horizons of expectation. Within this framework, spatial representation becomes a key site of interaction between text and reader, enabling diverse interpretive engagements.

In the context of Arabic and Algerian literary studies, scholars such as Hussein (2000) and Baza (2010) have explored the significance of space in narrative discourse, emphasizing its role in structuring events and shaping character experiences. However, these studies often remain confined to descriptive or thematic analyses, lacking integration with contemporary theoretical frameworks. This gap underscores the need for a more comprehensive approach that combines narratological, semiotic, and reception-oriented perspectives.

The present study addresses this gap by examining maritime space as a multidimensional construct that operates simultaneously as a narrative agent, symbolic system, and aesthetic experience. By situating the analysis at the intersection of spatial narratology and reception theory, the research contributes to ongoing debates on the role of space in literature, offering new insights into the interplay between narrative form, symbolic meaning, and readerly engagement.

How has the storyteller employed the sea within the narrative fabric of the short story?

The theme of the sea in Algerian narrative fiction constitutes a central reference through which its presence may be traced in artistic and aesthetic images that unfold and harmonize within the storyteller's imagination—particularly when the narrative trajectory shifts toward where the other stands, thereby endowing the short story with an event, a plot, and a conflict among characters situated within a specific time and space.

But how can one assert that the theme of the sea represents a source of attraction and inspiration for the storyteller? Has the sea become a pretext for writing a narrative text addressed to a reader whose interpretations are as diverse as the thematic and generic variations of the text itself? Does the short story possess a particular merit or privilege in establishing the sea as an autonomous literary subject? Furthermore, how does the sea manifest in creative writing, and what forms does its presence assume? Can it be argued that each short story possesses its own distinct sea, especially given that the sea carries multiple conceptual and symbolic meanings?

These questions, among others, will be addressed through the short story *"Light Blue... Dark Blue"*, included in the collection *Spectra of Scheherazade* by Samia Ben Dris, in the hope that it may provide answers. This inquiry proceeds from a problem that appears central to this research paper, namely, whether the storyteller employs a single theme or multiple themes within her narrative work. The guiding question is thus formulated as follows:

The Sea as Space and Signification

Human engagement with the forces of nature has developed progressively. In its eternal struggle with these forces, humanity moved from a stage of fear to one of reverence, eventually arriving—through an evolved consciousness—at the necessity of abandoning confrontation and defiance, and instead adopting respect and even reconciliation. This occurred through uncovering nature's laws and regulations, understanding and interpreting them in order to live in harmony, without seeking to tame or dominate them. Rather, this engagement has been driven by a quest for the unknown, a spirit of adventure, the pursuit of wonder and ambition, the fulfillment of material and spiritual desires, the opening of new horizons, and the establishment of human connection that overcomes isolation. Yet, humanity did not stop there; it began to engage with nature through writing, shaping it into poetry, short stories, and novels—just as droplets of water formed seas, rivers, and oceans.

Just as the wind stirs the waves of the sea, the sea, in turn, propels the events of the story. Indeed, "the sea, unlike other spatial patterns, constitutes a pivotal sign and a central focal point in contemporary Algerian literary discourse, owing to Algeria's coastal nature. Since most writers come from the northern coastal regions, the color blue has become pervasive in their texts, and they have carried the sea upon their shoulders. The sea has taken on

diverse forms, colors, and images through which the Algerian writer expresses experience, concerns, and viewpoints" (Said Shamsham, 2012, p. 08).

Yes, it is the sea—from whose depths the creator extracts ideas imbued with the most refined meanings and aesthetic forms; from whose reality the events of narrative works are woven; from whose waves characters emerge; and from whose imaginative inspiration the writer derives uniqueness. Does not everything have its own surge—and the sea, too, has its literature? Its stature lies in being a source of inspiration for the creator in multiple ways, as each writer leaves their own imprint through addition and omission, in accordance with the specific demands of their narrative particularities, which pulse with vitality. Ultimately, this creative reality becomes a purely aesthetic heritage, shaped by the writer's experience in intercultural exchange, the transmission of accounts, and their transformation into ideas and images. The more the sea rages and intensifies, the more it fuels the creator's fervor, stirring emotions with force, which is then reflected in words, expressions, and imagery. Conversely, when the sea calms and settles, it soothes and expands the writer's sensibility, which is translated into a creative expression that gratifies both the self and the recipient. It is the sea in its vigor and ferocity, enveloped in a deep and expansive spirit.

Moreover, "it is impossible to conceive a narrative without space; no events exist outside space, for every event takes place within a specific location and time" (Mohamed Baza, 2010, p. 99). While the sea has been extensively employed in Algerian poetic texts, it is also present in short stories and novels with considerable scope, due to the expansiveness that narrative grants the narrator, allowing them to analyze and explore the worlds of this captivating space with all its elements (Said Shamsham, 2012, p. 9).

This is the approach adopted by Samia Ben Dris, who situates the events of her short story *"Light Blue... Dark Blue"* within the orbit of the sea. The word "sea" itself is repeated seventeen (17) times in this short narrative text, which spans only four and a half pages. Its lexical extensions vary between foam, blueness, expansion, withdrawal, shore, sail, boat, and seagulls—the latter mentioned only once, yet functioning as part of a network that gathers all elements related to the sea, thus forming vivid images in the recipient's imagination. Meanwhile, boats and waves are each mentioned four times, emphasizing the dangers and hardships faced by boats whenever stirred by waves. Indeed, "the sea is indifferent; it expands and contracts, practicing its game with neutrality, playing its melody: the beginning and the end—the wave departs only to return, in renewed repetition" (Samia Ben Dris, 2016, p. 77). Yes, it is the sea, within which boats become "a swing swaying in the hands of the waves... and in a moment, life turns into a fleeing boat in the depths of the night" (Samia Ben Dris, 2012, p. 79).

In contrast, the color blue is mentioned five times, if we include the title of the story—an indication of this color, which carries meanings of strength, energy, and authority. It is indeed a color that significantly affects moods, emotions, and behavior. Blue is classified among the cool colors due to its prevalence in nature: the sky is blue, and bodies of water interact with its hue. It is known for its calming effect on the self, promoting relaxation, psychological comfort, and spiritual harmony with nature. It is also the color of the mind, intellect, and creativity, associated with enhanced concentration and clearer thinking. Moreover, when light, it conveys reliability, composure, cleanliness, and communication; when dark, it signifies confidence, dignity, intelligence, authority, and control.

Among its negative connotations are feelings of indifference, melancholy, negativity, sadness, isolation, emotional detachment, and coldness. Describing a scene, the author writes: "The boy walking toward school on foot, and the girl following in his footsteps, walk alongside the sea, wrapped in foam and dream, and a path adorned with a renewed blueness" (Samia Ben Dris, 2012, p. 76).

The storyteller then shifts in her deployment of the color blue to a more perilous maritime phase, when sailors appear in the narrative, enduring the hardships of the sea and struggling against it in a reciprocal contest—at times offering it some of their lives in exchange for what lies hidden in its depths of secrets and spoils: "– Hila hop, hila hop... the sailors cried out as they ventured deeper into the dark blue, the pitch-black color, the secrets, the spoils, and destruction" (Samia Ben Dris, 2012, p. 79).

Conversely, shells are mentioned eight times, and the author transforms them into a theme open to the symbolism of motherhood, which evokes tenderness, warmth, and profoundly harmonious spiritual human bonds between mother and child. The shell thus establishes an organic relationship between the protagonist Jamal, the heroine Nadia, and the sea, considering that "the spatial imprints in a character's life permeate biological, psychological, and social levels" (Hussein Hussein Khaled, 2000, p. 114). This is clearly reflected in the story, where it is stated: "He holds a shell in his hands: 'Look, this resembles a mother who has lost her daughter. The word "shell" suggests superficiality—so people believe,' he laughs, 'but you know it is only a shell in the eyes of those who do not see. You know those artifacts at home—I dream of holding an exhibition for them, to restore their dignity... theirs, of course'" (Samia Ben Dris, 2012, p. 78).

Thus emerges a refined aesthetic image of the sea when it is associated with the concept of the mother in relation to her daughter: the mother is the home, the refuge, protection, security, and tenderness, while the daughter is the pearl hidden within the shell, since one of its meanings is the covering of the pearl. This is from Jamal's perspective. As for Nadia, she perceives in the arrangement of colored shells—forming a necklace—a profound image marked by attachment, adherence, loyalty, and submission. Indeed, the shell carries a meaning greater than its physical size: it is the home that contains tranquility and safety. It is therefore not merely a casing that once contained a soft-bodied creature and then abandoned it; rather, it is characterized by strength and solidity—some shells are lustrous, others dull in color.

This same idea extends to the depiction of the sea's neutrality, alluding to coral formations, which are in fact colonies of marine organisms displaying dazzling colors. When illuminated beneath the sea, they evoke a poetic sensation. As the text states: "The colored shell necklace around her neck carries a deep meaning of attachment, adherence, loyalty, and submission... thus, the shell is not merely a shell; it is a home, an artifact—or an artistic project. A companion who has lost its companion, cast ashore at a waiting station ... and the girl strives to overcome the negative meaning associated with the shell" (Samia Ben Dris, 2012, pp. 77–79).

Accordingly, the attraction to the world of the sea and its elements becomes a form of recalling moments of a beautiful past, particularly through the theme of motherhood, security, and attachment—most vividly expressed in her bond with the sea. Indeed, she "immersed her feet in the water and leaned against a rock by the sea" (Samia Ben Dris, 2012, p. 77). She submerged her feet in the water and rested against a rock—a symbol of solidity and firmness—to affirm her rootedness and attachment to a place that is part of her, just as she is part of it.

As for the sea and water, their presence was equally significant within this short narrative text, reflecting the deep connection of the theme of the sea with the imagination of the storyteller, as well as with her memory, which is captivated by everything that forms the wondrous image of this space—a space that orchestrates meetings and separations, sows pain and hope, transmits fear and reassurance, spreads love, generates life, and sketches death. She addressed this when she wrote: "Tomorrow, the tears will meet in the expanse of the sea—her evening tears and his nightly tears will dissolve in the great estuary water, yet together they will come to know the identity of this water; water will recognize water, and its particles will fuse..." (Samia Ben Dris, 2012, p. 80).

Since the sea is a space of connection and openness to the world, as well as an open temporal horizon, it produces a mentality and a type of behavior different from that found in inland or desert regions. The sea inspires a desire for exploration, for connection with others, or for receiving and communicating with them—a desire that necessarily generates a different mindset and makes people more willing to establish human relationships (Saleh Walaa, 2010, p. 120). The sea thus forms a focal point of dense semantic radiance, infusing the narrative text with artistic and imaginative energies across multiple readings, engaging psychological, emotional, existential, and social dimensions.

The storyteller did not stop there; she extended her treatment to anthropomorphism, convinced that when "the narrator humanizes manifestations of the external world, incorporating them into their artistic work, and allowing them to perform a new human function, they contribute to creating the overall atmosphere the artist aims to achieve, aligning with human beings, their emotions, and thoughts, so that they share in suffering, oppression, and joy. This juxtaposition arises from a personal and artistic need to interpret events in a distinct internal way and to depict life creatively, with a new vision characterized by comprehensiveness and absolute humanity" (Ahmed Morshid, 2003, p. 8).

A discerning reader will recognize in the storyteller's anthropomorphization of the sea an example of an experienced narrator whose humanistic vision of the universe manifests depth, beauty, and vitality. Indeed, "the sea is indifferent; it expands and contracts, playing its game with neutrality, performing its melody: the beginning and the end—the wave departs to return, in renewed repetition." One might imagine the sea as a human required to respond to situations that spark attention; the storyteller attributes to it a psychological human state: indifference and a loss of sensation when it expands and contracts, when it plays and performs its melody without concern. Moreover, she conveys a sense of boredom as an emotional feeling, allowing humans to recognize when they are performing an activity that brings neither intellectual enjoyment nor satisfaction, due to the monotony of repetitive action.

Even "the neutrality of the sea—the blue façade, laden with evening presence, emptiness, and empty dreams" (Samia Ben Dris, 2012, p. 77) and "water embraces water... tomorrow, the tears will meet in the expanse of the sea—her evening tears and his nightly tears will dissolve in the great estuary water, yet together they will come to know the identity of this water; water will recognize water, and its particles will fuse..." indicate unity, inclusion, connection, intimacy, wholeness, grasping, meeting, and tender embracing. Through this, the storyteller gives water an identity by which it senses itself and its individuality, understanding its value—an identity with distinct features and authenticity, much like a human being who possesses an absolute reality and intrinsic attributes.

The Sea as Human Memory

The sea enticed the creative storyteller, drawing her toward writing that is engaging, detailed, and precise, in which she fully exercised her imagination. She attended to the minutiae concerning characters, events, and specific scenes, captivated by this enchanting space, which she filled with dense symbols and abundant meanings. The sea serves as a symbol of life's renewed movement and energy, as well as a symbol of motherhood in its generosity and fertility. It also represents purity and clarity, while simultaneously echoing in its turbulent waves an eternal struggle between life and death, calm and agitation, silence and roar, elevation and descent, ebb and flow.

Just as this space inspired the storyteller and provided her with positive energy that she channeled into creativity, so too did it inspire words, expressions, and ideas, which submitted themselves to her, carrying within them a visual memory. She gathered her sensations to navigate diverse human worlds, ultimately anchoring them along the shores of her story's pages. There, the sea connects with a network of sensory, chromatic, kinetic, auditory, and visual images—some explicitly presented, others implied—but all arranged with an artistic and integrated style, in which events are ordered and harmonized with characters, dialogue, and descriptive scenes. This arrangement grows progressively, intending to heighten the effect on the recipient and stimulate the imagination of events that, in reality, comprise multiple occurrences, reflecting her expertise, culture, and knowledge of the depths of this expansive horizon.

Indeed, the sea is described as "spacious and boundless, its horizon distant under the undefined expanse of the universe. The sea moderates the heat, its ports connect with large ships and loading docks, massive iron gates, stacked goods, crates, and containers... the lives of fishermen are linked to the sea's conditions, and in summer, alleys and beaches transform into beehives" (Mohamed Djibril, 2000, p. 22). This is evident in the selected excerpts from her narrative text. Among the auditory images that give the text a particular resonance, she writes: "And the marble dew whispered, rising like the moon from the palm of the hand" (Samia Ben Dris, 2012, p. 76), and: "It performs its melody: the beginning and the end—the wave departs to return," as well as: "And this oar, the roar of the waves, and the voice of Fairuz fill the expanse... and she is alone, unable to hear Fairuz and the music of the sea in her language" (Samia Ben Dris, 2012, p. 79). She also writes: "Hila hop, hila hop... the sailors cried out," and: "The seagulls departed, ceasing their cries and calls" (Samia Ben Dris, 2012, p. 80).

These auditory images—the melody and music of the sea, the sailors' cries on the open water, the seagulls, and the voice of Fairuz filling the space—collectively create a magical soundscape of the sea. This enhances human mood, generating psychological comfort and inner calm, releasing hormones that soothe the body both psychologically and physiologically, renewing energy and providing positive vitality for work and life, thereby restoring vigor and efficacy.

Regarding olfactory imagery, it relies on the sense of smell, which activates the nose to capture the scent of the sea, permeating the brain, influencing it with its enchanting fragrance, refreshing it, restoring mental energy and vitality, and providing bodily balance and relaxation. This is evident in her words: "The girl's scent mingles with the scent of the sea" (Samia Ben Dris, 2012, p. 76), and: "The girl follows the labyrinth in a state of relaxation, her senses numbed" (Samia Ben Dris, 2012, p. 77). This granted the girl an inner capacity to resist anxiety and a bad mood, enhancing her psychological rejuvenation and spiritual well-being.

The sense of taste is also present in her narrative, activating the recipient's full sensory perception and allowing them to savor the taste of seawater mixed with the saltiness of tears, both being saline waters: "Evening spilled into the girl's eyes; her eyes overflowed with salty water flowing into the sea, water mingling with water, dissolving into water—a private message she sent" (Samia Ben Dris, 2012, p. 80).

As for chromatic imagery, the storyteller employed a spectrum of soothing colors, evoking joy and tranquility at times, as in: "They are wrapped in foam and dreams, along a path tinged with a new blue" and "The girl with the red skirt... toys with the colored shell necklace around her neck" (Samia Ben Dris, 2012, p. 77). She also notes: "the color of his eyes, mirroring the hue of seaweed" (Samia Ben Dris, 2012, p. 79). In contrast, darker colors convey sadness, loneliness, anxiety, and fear, for instance: "The neutrality of the sea—the blue façade, burdened with evening presence, emptiness, and hollow dreams" (Samia Ben Dris, 2012, p. 77), and: "They advanced inward into the dark blue, the murky color," which may portend peril. She also observes: "She does not have enough courage to hear the song alone, for the sea would extend vast and dark, and she is alone without a sail" (Samia Ben Dris, 2012, p. 78). This suggests that the sea, particularly at night when visibility is lost, evokes awe, anxiety, and immobility, intensifying human sensitivity to surrounding stimuli and heightening perception of any unusual sound, touch, scent, or movement. The girl's courage diminishes, illustrating this effect.

Because the sea is so dynamic, the storyteller concentrated on kinetic imagery, frequently incorporating it into her narrative as an inseparable part of movement and activity. This serves as a method of expressing ideas, emotions, and concepts through bodily responses to a stimulus, such as the sea and its waves. The text is replete with such

imagery: "A boat fleeing in the depths of the night," "The boats depart into the depths of the night as if a swing swaying in the hands of the wave," "Wounds are streams in the expanse of their meaning, and in their manifold faces they end in the wider infinite estuary" (Samia Ben Dris, 2012, p. 78). These are all visual scenes imbued with sensory beauty, enriched with stylistic and rhetorical devices, enhancing the narrative's aesthetic radiance.

Moreover, she employed repetition explicitly to achieve textual cohesion and harmony, reinforcing and consolidating meaning, as seen in: "He departed on a boat in the silence of the night," "A boat fleeing in the depths of the night," "And the boats depart into the depths of the night"; "The sea would extend vast and dark," "And the emptiness extends immensely, and the dreams diminish"; "And this oar, the roar of the waves," "And the waves roar"; "Water mingled with water," "Water dissolved into water," "And the water embraces the water," "Water will know water" (Samia Ben Dris, 2012).

She narrated these within sentences and phrases that expanded on the image of the sea with all its details, conditions, and states, presenting it as a spatial narrative element with influential, almost humanized, qualities—not inferior in value to other components such as characters, events, dialogue, time, and narrative fabric. In fact, it may surpass them, particularly when it is the central subject of the creative work. The sea, as an objective equivalent, combines positive features—such as vastness, openness, and spaciousness—that instill comfort, tranquility, and serenity in humans, alongside negative aspects—such as depth, fissures, and agitation—that evoke fear, awe, and vulnerability, suggesting the potential for betrayal:

"Despite herself, she gazed at the horizon with vague anxiety, immersed her feet in the water, and leaned on a rock by the sea. Circles beget circles, and the girl follows the labyrinth in a state of relaxation, her senses numbed. The boats depart, and no one restrains her from leaving, and the hearts hang like small birds flapping wildly" (Samia Ben Dris, 2012, p. 77).

Does the Sea Have a Language?

The language of the sea in the short story plays with the reader as its waves play with humans, seducing them with its rebellious movements and tossing them with its ebb and flow, asserting its power without coercion or intrusion upon the many intimate spaces where the storyteller's language luxuriates. This language is composed of words drawn from a private lexicon, in which both explicit terms and symbols carry strong presence, sound holds even greater weight, and emotions shine most vividly.

The direct lexical items appear with their common and latent meanings, such as foam, waves, shore, water, neutrality, and sea down (*zghab al-bahr*). For example: "The boy walking toward school on foot and the girl following his steps walk alongside the sea, wrapped in foam and dreams," "And the boy's body covered with sea down," "The neutrality of the sea, the blue facade" (Samia Ben Dris, 2012). Notably, the word *sea* itself consists of two strong voiced letters surrounding a soft unvoiced one, reflecting the essence of its meaning and qualities, fluctuating between high and low waves; it embodies expansiveness and undulation, rising and falling, shouting and whispering—expressing both entreaty and apprehension. As the text illustrates: "The sea extends vast and dark, and she is alone without a sail... The waves roar, and the emptiness stretches immensely, and dreams diminish... The boats depart, and no one restrains her from leaving, and hearts hang like small birds flapping wildly" (Samia Ben Dris, 2012, p. 77).

Sound emanates from the waves in their playful caresses at times and in their violent clashes at others, alternating between soft whispers and loud turmoil: "The sea does not care; it extends and recedes, playing its game with neutrality, performing its melody: the beginning and the end. The wave goes and returns, the repetition renewed, circles beget circles" (Samia Ben Dris, 2012).

Emotions reside in the sea's depths, captured by the storyteller through luminous and hazy expressions, casting them into the hearts of readers of all kinds, allowing them to dive deeply into the story's pages with only their procedural tools, to uncover profound meanings and reconstruct beauty within a state of ecstasy. For the sea is a truly vital world, inseparable from life: it contains resistance and determination, anger and tumult, loss and gain, as well as dreams and surrender. As the story describes: "According to the anticipation in the trembling of the spirit, and the marble-like dew rising like a moon from the palm of the hand, and the eyes looking toward the birth of an extraordinary moment resembling the moment of birth, or the illumination of Laylat al-Qadr and the crescent of Eid in childhood" (Samia Ben Dris, 2012, p. 76); and: "The girl questions and distances herself as much as possible from negative interpretations; for the sun rises over the universe, and the sea extends. According to her readings—according to what the books say—negative meaning is a choice, which she seeks to combat. Every wound is a treasure, granting life new meaning and richness. The wounds are streams in their expansive meaning, and in their manifold faces, they reach the widest, infinite estuary" (Samia Ben Dris, 2012, p. 78).

A careful reader of this short story will recognize how they interact with its characters, sensing the depth of the events in their joyful, sorrowful, or painful atmospheres, and perceiving the power of the author's expression in

conveying emotions, with a precise balance that avoids exaggeration. On this basis, the creative lexicon of the Algerian environment celebrates the sea as an essential value for the continuation of life, and the short story "Light Blue... Dark Blue" is narrated by the storyteller in a style whose aesthetic derives from the depth and expansiveness of the sea.

The Heroes and Characters of the Sea Amid the Event

It is not necessary for a creative writer to be a sailor in order to describe the sea in their narrative; nor is it necessary to specialize in maritime literature or dedicate standalone stories or novels to the sea to be recognized as a writer of the seas. Rather, it suffices for the author to employ a lexicon comprising a range of words and expressions—explicit or implicit—across their creative works, which grants them the status of a literary narrator, able to join the ranks of those who write about the sea and its world. The sea, after all, is too vast to be confined to specific characters or events, and conversely, characters—whether real or fictional—transcend the sea in consciousness and thought, while the sea surpasses them in force and intensity.

The storyteller endows her two protagonists with physiological and moral traits drawn from their environment, including strength, height, beauty, daring, adventure, courage, vigor, and desire. These qualities reflect the *futuwa*, the virtue of youth between adolescence and manhood, encompassing moral virtues such as generosity, bravery, assistance, piety, tenderness, and chivalry. They are powers of the soul, representing the complete human being who aspires toward wide horizons to contemplate and reflect on the divine order. It also conveys a strong manly figure, capable of imposing protection over a neighborhood or region, taking compensation from those he guards.

The author employs the word *boy* more than twenty-two times, as in: "The girl's scent mingles with the sea's scent, and the boy's body is covered with sea down; the boy accelerates while the girl slows, the girl accelerates while the boy slows" (Samia Ben Dris, 2012, p. 77). She continues to describe him whenever necessary: "The tall boy with curly hair departed on a boat in the silence of night, and the neutrality of the sea, the blue facade, marked its evening presence heavy with emptiness and hollow dreams. He wrote his name on the rock: Jamal, followed by question marks and infinite dots" (Samia Ben Dris, 2012, p. 77).

The narrative deepens this enigmatic character, leaving the reader uncertain of his identity—is he a father, a brother, a lover? A relative or a distant acquaintance? Or merely a schoolmate whose friendship evolved into love? Even the character himself seems uncertain: "He wrote his name on the rock: Jamal, followed by question marks and infinite dots" (Samia Ben Dris, 2012, p. 79). His presence is further imbued with sensory and emotional significance: "From the moment eyes look toward the birth of an extraordinary moment resembling birth itself, or the illumination of Laylat al-Qadr and the crescent of Eid in childhood... her steps accompanied him ever since she recognized the meaning of morning opening her eyes to his face and the color of his eyes that mirrored the seaweed" (Samia Ben Dris, 2012, p. 79).

Similarly, the sailors in the story carry traits, behaviors, legends, and visions shaped by the sea and their confined ship: "They have characteristics defined by the sea, behaviors shaped by the sea, and legends, stories, and visions linked to the vast sea and the narrow vessel" (Abdelhamid El-Mohadine, n.d., p. 227). This reflects the harshness of life when fate casts them into the dark night within a cramped boat, struggling against roaring waves, uncertain where they will be cast and whether they will return: "If life is this sea voyage, and this oar and the clamor of waves and the voice of Fairuz filling the expanse, overcoming its loneliness and darkness, if life is a small boat carrying them forever, a swing rocking between the hands of the waves... The girl sighed, her eyes fluttering in a moment of sudden wakefulness. In a moment, life transformed into a fleeing boat in the depth of night" (Samia Ben Dris, 2012, p. 79).

Similarly: "The water does not reveal, the phone does not ring, and the waves roar, and the emptiness stretches immensely, and dreams diminish, while the girl strives to overcome the negative meaning in the shell, her stature growing with anticipation, and the boats depart into the depths of the night" (Samia Ben Dris, 2012, p. 79). In their departure, the narrative leaves an imprint of the tragic reality of human life.

The Sea as a Space Shaping the Characters: Jamal and Nadia

The question remains, awaiting a conclusive answer: was the sea a functional space in embodying the dimensions of the story's characters—Jamal and Nadia? The author carefully selected names connected to the sea in its color, expanse, depth, purity, awe, and the sense of order, relaxation, and harmony it inspires. *Jamal* connotes beauty and virtue; it is a masculine name meaning excellence in appearance and behavior, as well as complete adornment, reflecting good character and ethical conduct. *Nadia*, a feminine name, means "dewy" or "moist from dew or rain," and etymologically comes from Slavic and ancient Greek roots meaning "hope."

The storyteller endows Nadia, too, with rich, positive character traits. She writes: "The girl's scent mingles with the scent of the sea... she rubs the handkerchief with her left hand, while her other fingers—the bitten nails—play with

the colorful shell necklace around her neck, in a kind of deep meaning of attachment, clinging, honesty, and submission..." (Samia Ben Dris, 2012, p. 76). Nadia's psychological states unfold across morning and evening, revealing a range of emotions: joy, fear, and anxiety due to solitude. Alone without a sail, she cannot bear to hear Fairuz's voice by herself and lacks the courage to do so. Yet, despite herself, she gazes at the horizon with vague anxiety, sighs, and opens her eyes in a moment of sudden awareness as the evening spills into her heart and eyes: "Her eyes overflowed with salty water, flowing into the sea; the water mingled with water, dissolved in water, a special message she sent" (Samia Ben Dris, 2012, pp. 79–80).

The author tightly controls the material and moral particularities of Nadia, presenting her as a composite of diverse emotional and behavioral responses. She is a playful, energetic child with a positive consciousness, rejecting negative readings: "The girl in the floral skirt jumps rope and then disappears each evening... she reappears on the balcony and disappears in haste, as if performing a farewell greeting, returning reassured" (Samia Ben Dris, 2012, p. 76). Nadia herself affirms her rejection of negative meaning, seeing it as a choice, while positive meanings are limitless: "The girl questions and pushes away as far as possible the possibilities of negative meaning; because the sun rises filling the universe, and the sea expands... according to her readings, negative meaning is a choice, which she seeks to fight. Every wound is a treasure, granting life new significance. Wounds are streams in the expanse of their meaning, and in the multiplicity of their faces they end in the widest, infinite estuary" (Samia Ben Dris, 2012, p. 76).

The events of the story are rich and diverse, often intersecting with the sea itself. They range from Nadia's solitary play—"The girl in the floral skirt jumps rope"—to her playful interactions with Jamal: "The boy accelerates while the girl slows, the girl accelerates while the boy slows... a game of shadow and light, dream and wakefulness." The events unfold within the sea's calm and playful waters, enjoying its sand and shells: "Circles beget circles, and the girl follows the labyrinth in a kind of relaxation, her senses numbed" (Samia Ben Dris, 2012, p. 76). Her fingers play with a colorful shell necklace as noted above, while the pivotal event involves the departure of the sailors' boats: "They ventured inward into the dark blue, the somber color, the secrets, the spoils, and doom" (Samia Ben Dris, 2012, p. 79).

From the narrator's perspective, the sea remains an expressive, procedural tool, rich in aesthetic qualities, designed to reach the reader's heart emotionally and influence their mind persuasively.

Beyond the Centrality of the Sea

Just as water—"rivers, seas, oceans"—covers two-thirds of the Earth's surface, it occupies a significant place in Algerian narrative space, serving as a setting in which events unfold, characters move, and parts of the text interweave, while also engaging the reader. The sea functions as a symbol of life's dynamism and vitality, even under the constant awareness of its dangers and perils. Yet this does not prevent the girl in the floral skirt from immersing herself in the sea and relaxing in its waters despite her anxiety and lack of courage, nor does it prevent the boy from riding its waves in pursuit of treasures and secrets.

The sea emerges as a distinguishing marker in the formation of Algerian women's narrative, specifically in the work of the storyteller Samia Ben Dris. Despite the brevity of her story, it is dense with vocabulary and phrases evoking the sea: shells, water, the expanse of the sea, boats, blue hues, waves, ebb and flow, and the roar of surf. This reflects the female author's fascination with and love for the sea, as a space of rest, serenity, reflection, and emotional release—a space she cherishes and seeks to embrace whenever life's harshness overwhelms her. She attempts to explore this captivating, vast domain through her own self, employing her senses consciously to capture images and scenes that overflow with poetic resonance.

Since the sea functions as a narrative theme intertwined with place and connected to human experience, it becomes, in her imagination, a symbol of growth, purity, freshness, and life. In Samia Ben Dris's storytelling imagination, the sea—through its scent and movement—takes on humanized qualities, connecting deeply with the essence of the self. She constructs this imaginary world with all the procedural tools at her disposal, intensifying its symbolic and semantic dimensions, thus creating a unique aesthetic quality in a horizon imbued with meaning. This reveals the psychological and human depth of the girl, whose being roots itself in the sea as she sets her feet in its waters, adorns herself with a shell necklace, and breathes in its scent. Likewise, the boy, Jamal, identifies with the sea in its particularities, leading him to reflection and contemplation: "Water existed before language; that is, in the beginning there was water—thus one ought to say—right?"

The Enduring Role of the Sea in Samia Ben Dris's Narrative

"...And I dream of holding an exhibition for it, to restore its due credit... naturally for it" (Samia Ben Dris, 2012, p. 78). This narrative passage unveils the emotional state of the protagonist, Jamal, whose love for the sea elevates him to a plane of emotional and cognitive transcendence. He perceives himself as a thinker correcting misconceptions, striving to restore order and purify human consciousness from the impurities of life by ascending to alternative

realms that reestablish balance and identity. All these qualities distinguish Jamal's character, revealing his temperament and behavior, and making his image tangible in the reader's mind. As Ceza Qassem (1985, p. 115) observes, "the life of a character is explained by the nature of the place to which it is connected."

While the author's engagement with the sea energizes her writing, it simultaneously enriches the interpretive experience of the reader, especially when the story addresses the existential issue of sailors confronting dangers to secure their livelihood—a perennial concern of the human condition. In *Light Blue... Dark Blue*, the presence of the sea manifests from the very cover, which artistically reflects the watery environment through hues drawn from the sky's blue, the green of grass, and sunlight filtering through leaves, stimulating the reader's desire to engage with the text. The opening of the story serves as "a threshold that functions as a bridge between two essential moments: silence and speech" (Abdelmalek Ashbahoun, 2013, p. 34). This is evident in the depiction of the protagonists, where words condense into gestures conveying much beyond speech:

"The girl in the floral skirt jumps rope and disappears as evening falls. The tall, silent boy watches her between the mulberry leaves, his gaze reaching the garden, then the window where the curtain moves lightly. The girl reappears on the balcony, disappearing again in haste as if performing a farewell gesture; he returns reassured" (Samia Ben Dris, 2012, p. 76).

The sea, with its mesmerizing beauty, inspires the narrator's imagination, allowing her to infuse it with profound emotional resonance. It provides abundant symbolic material: shells, coral reefs, seaweed, the ebb and flow of water, each detail generating layers of meaning. The intertwining of the sea with the narrator and her characters motivates the renewal of life itself:

"The girl returns home each evening, looks toward the balcony as a habit, moves the curtain, the evening spills in, streetlights glow, and her candles extinguish" (Samia Ben Dris, 2012, p. 78). "Tomorrow the tears will meet in the open sea—her evening tears and his night tears—melting into the water; yet they will come to know the identity of this water, the water will recognize the water, and its particles will merge... In the beginning, there was water..."

Thus, the sea remains a central element in the artistic construction of the narrative. Within its domain, characters act, express themselves, and derive extraordinary vitality that transforms ordinary individuals into heroes endowed with charisma, even amid the sea's potential perils. The theme of the sea engages with fundamental human concerns—both tangible and intangible—and holds a place in collective memory and the personal memory of the creator. By animating the sea with human traits and investing it with narrative significance, the author transforms it into a refuge for the weary and the lovers, a source of both challenges and solace. The sea becomes a space where the creative mind can dive to uncover treasures, gathering its water, sand, pearls, and shells to weave tales, stories, and novels whose thematic richness and aesthetic beauty know no bounds for the reader.

Discussion

The findings of this study reveal that maritime space in Samia Ben Dris's short story functions as a complex and dynamic narrative mechanism that transcends its conventional role as a physical setting. Rather than serving as a mere backdrop for events, the sea emerges as an active agent that shapes narrative progression, character psychology, and thematic development. This aligns with contemporary narratological perspectives, which conceptualize space as an integral component of narrative structure (Bal, 2009; Herman, 2002).

From a semiotic standpoint, the sea operates as a multilayered signifying system, generating meanings through its interplay with linguistic, visual, and sensory elements. The repeated use of maritime imagery—such as waves, shells, and chromatic variations—creates a dense symbolic network that reflects the dual nature of the sea as both a source of life and a site of existential uncertainty. This duality resonates with Lotman's (1990) notion of cultural semiospheres, within which meaning is produced through the interaction of contrasting elements.

The analysis also demonstrates that the sea plays a crucial role in mediating the relationship between text and reader. Through the use of descriptive density, repetition, and sensory imagery, the narrative invites readers to engage actively in the process of interpretation. This supports Iser's (1978) theory of aesthetic response, which emphasizes the reader's role in actualizing textual meaning. The indeterminacy of the sea's symbolic function allows for multiple interpretations, thereby enhancing the text's openness and interpretive richness.

Moreover, the anthropomorphization of the sea contributes to its narrative centrality, transforming it into a quasi-character with emotional and psychological attributes. This technique not only intensifies the aesthetic experience but also reinforces the interconnectedness between human and natural worlds. As Bachelard (1994) suggests, such representations enable literature to explore the intimate relationship between space and human consciousness, revealing deeper layers of meaning.

The study further highlights the importance of sensory imagery in constructing the narrative's aesthetic framework. Auditory, visual, and tactile elements combine to create an immersive experience that engages the reader's

imagination and emotional response. This aligns with Ryan's (2014) concept of narrative immersion, which underscores the role of sensory detail in enhancing reader engagement.

Finally, the findings suggest that maritime space functions as an epistemological framework through which broader themes—such as identity, memory, and human existence—are articulated. The sea becomes a site of reflection and transformation, enabling characters and readers alike to confront fundamental questions about life, loss, and belonging. In this sense, the narrative transcends its immediate context, offering insights into universal human experiences.

Conclusion

This study has demonstrated that maritime space in Samia Ben Dris's narrative operates as a central aesthetic and epistemological construct, shaping the text's narrative structure, symbolic meaning, and readerly engagement. By integrating perspectives from spatial narratology, semiotics, and reception theory, the research provides a comprehensive analysis of the sea as a dynamic and multifaceted narrative element. The findings confirm that space in literary discourse cannot be reduced to a passive setting; rather, it functions as an active agent that influences all aspects of the narrative. The sea, in particular, embodies a rich spectrum of meanings, reflecting its dual nature as a source of harmony and conflict, stability and transformation. This duality enhances its capacity to generate complex interpretations and to engage readers in a process of continuous meaning-making. Furthermore, the study contributes to the broader field of literary studies by highlighting the importance of interdisciplinary approaches in analyzing narrative space. By bridging theoretical frameworks and textual analysis, it offers new insights into the role of space in shaping literary experience and interpretation. From a practical perspective, the research underscores the significance of spatial analysis in understanding contemporary narrative forms, particularly in contexts where cultural, psychological, and aesthetic dimensions intersect. It also opens avenues for future research, including comparative studies of spatial representation across different literary traditions and the exploration of digital and multimodal narrative environments.

In conclusion, maritime space in Ben Dris's work exemplifies the transformative potential of literary space, demonstrating how physical environments can be reimagined as powerful sites of aesthetic expression and intellectual inquiry. Through its intricate interplay of form, meaning, and reception, the narrative invites readers to engage deeply with the text, reaffirming the enduring relevance of space as a fundamental category of literary analysis.

Ethical Considerations

This study was conducted in full compliance with internationally recognized ethical standards for research and publication. As the research is based on literary analysis and does not involve human participants, animals, or confidential data, formal ethical approval was not required. Nevertheless, the study adheres to the ethical principles outlined by the Committee on Publication Ethics, including integrity, transparency, and academic honesty. All sources have been appropriately cited, and the work respects intellectual property rights and academic integrity norms.

Conflict of Interest

The author declares that there are no conflicts of interest regarding the publication of this article. The research was conducted independently, without any financial, institutional, or personal relationships that could influence the outcomes or interpretations presented in this study.

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Plagiarism Statement

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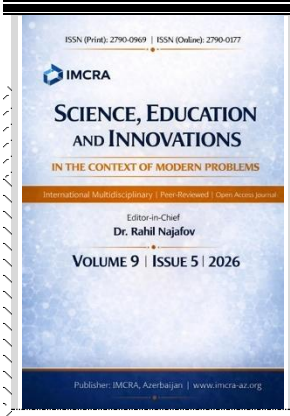
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RESEARCH ARTICLE

Reconstructing Financial Security in the Age of Artificial Intelligence: From Algorithmic Fraud Detection to the Institutionalization of Sustainable Digital Trust in a Hyperconnected Global Economy

Moussaoui Hadjer
Dr.
Faculty of Economics, Commercial and Management Sciences; University Algiers 3
Algeria
Email: moussaoui.hadjer@univ-alger3.dz

Benhammou Fayza
Prof.
Laboratory: Globalization and Economic Policies; Faculty of Economics, Commercial and Management Sciences; University Algiers 3
Algeria
E-mail: Benhamou.faiza@univ-alger3.dz

Keywords Artificial Intelligence; Financial Security; Digital Fraud; Machine Learning; Behavioral Biometrics; Digital Trust; Explainable AI (XAI); Cybersecurity; Adversarial AI

Abstract

In the context of accelerating digital transformation and the exponential growth of cyber-financial threats, the concept of financial security is undergoing a profound structural redefinition. This study investigates the transformative role of artificial intelligence (AI) in enhancing financial security systems, particularly in mitigating sophisticated forms of digital fraud, including adversarial attacks, deepfakes, and automated phishing schemes. Drawing upon a descriptive-analytical research design, the paper integrates theoretical insights with empirical evidence from global financial institutions to examine how machine learning algorithms, behavioral biometrics, and real-time data analytics contribute to proactive fraud detection and risk mitigation. The findings indicate that AI-driven systems significantly outperform traditional rule-based mechanisms, achieving fraud detection accuracy rates exceeding 95% while reducing false positives by up to 90%. These improvements not only enhance operational efficiency but also contribute to the construction of "digital trust" as a foundational pillar of modern financial ecosystems. The study further explores the dual nature of AI as both a defensive and potentially adversarial tool, emphasizing the emergence of a continuous technological arms race between financial institutions and cybercriminal actors. In addition, the research critically examines the ethical, legal, and governance implications associated with algorithmic decision-making, highlighting the necessity of explainable artificial intelligence (XAI), transparency, and human oversight to ensure fairness and accountability. The paper proposes a strategic framework for integrating AI technologies into financial systems through a balanced approach that aligns technological innovation with data privacy, regulatory compliance, and user-centric design. Ultimately, this study contributes to the evolving discourse on financial security by conceptualizing AI not merely as a technological instrument but as a systemic enabler of sustainable digital trust, essential for the long-term resilience and stability of the global financial architecture.

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Introduction

The global economy has evolved into a world filled with large amounts of encrypted information traveling across borders in a matter of seconds, as opposed to mere figures recorded on pieces of paper, because of the rise of information in the digital age. As a result, cyberspace has evolved into an open battle arena for innovation and danger. As a result, the art of financial fraud has evolved from basic and conventional types of fraud into sophisticated hacks involving spoofing algorithms and behavioral engineering, giving rise to previously unheard-of security challenges. As human intervention is no longer sufficient to combat the high volumes of dubious information, "artificial intelligence" has emerged as a technical tool and an intelligent guardian with real-time prediction and response capacities.

Essentially, artificial intelligence is the mastermind that secretly oversees billions of financial transactions in an attempt to detect trends that even the most skilled minds might miss. Carefully observing abnormalities in behavior, it aims to detect crimes before they are committed instead of reacting after the damage has been done. (Forum, 2023) The importance of this technology can be seen in its role as a basis for establishing "digital trust," a concept represented by a new form of currency that will play a vital role in the economy of the future. The digital journey of the user is protected and enhanced by artificial intelligence. We are living in a world characterized as a 'digital arms race.'

The adoption of machine learning and deep neural network technology solutions represents a sovereign requirement for financial institutions, as opposed to a preferred option, in a world where innovators and fraudsters are locked in a struggle for preeminence in technology development. Artificial intelligence technology represents a safety valve for savings, for privacy, and for redefining financial security in a world becoming increasingly interconnected and complex. This illustrates that the technology used to open security vulnerabilities holds the brilliant keys for closing these vulnerabilities and assuring the world economy for the future. (BioCatch, 2024)

Principal Problem:

Considering the increasing methods for cybercrime, how can artificial intelligence find a balance between user information privacy and a smooth digital experience on one side, and financial security and digital fraud on the other?

Secondary Problem Descriptions:

What types of artificial intelligence methods, such as machine learning and biometric analysis, are most commonly used for early identification of complex types of fraud schemes?

How much do artificial intelligence technologies contribute to reducing technical errors (false positives) and trust between clients and financial institutions?

What are the ethics and laws concerning organizations' sole reliance on algorithms for complex financial decisions?

Study Goals:

This study aims to achieve a number of goals, such as:

In consideration of the fast development of digital fraud methods, this study aims to diagnose the state of finance while pointing out the drawbacks in traditional systems. This is based on how well artificial intelligence systems can process large amounts of data and instantly identifies suspicious activity. Moreover, based on the positive association between improving digital security and customer happiness and trust, the study looks into the future. Finally, this study aims to provide financial institutions with a road map on how to safely integrate AI technology while promoting digital sustainability.

Research Methodology

To achieve these objectives, it is proposed to adopt the descriptive-analytical approach through the following steps:
• **Descriptive Aspect:** By reviewing previous literature, current artificial intelligence technologies, and modern types of financial fraud to build a comprehensive knowledge base.

• **Analytical Aspect:** By analyzing real-world case studies of global banks or FinTech companies that have implemented artificial intelligence, and comparing fraud rates before and after the adoption of these technologies.
• **Comparative Approach (Optional):** You may compare the efficiency of rule-based systems versus AI-based systems in terms of speed and accuracy.

Study Structure:

This scientific paper is divided into three sections. The first section is focused on the analysis of the relationship between artificial intelligence and fraud. The second section is focused on the evolution of AI technologies in order to

build trust. Finally, the third section is focused on the challenges related to the continuous fight between AI technologies and fraud.

Section One: Artificial Intelligence and Fraud

In the current scenario, artificial intelligence is recognized as the "first line of defense" in the global financial system. With the evolution of cybercrime techniques, it is not possible to tackle the modern cybercriminals using rule-based systems. With the advent of full digital transformation (Chu, 6 October 2025), in the financial system, the scope of financial fraud is not restricted to the theft of physical cards; it is extended to the forgery of digital identities, phishing, and the laundering of crypto currencies. At such junctures, artificial intelligence is playing a vital role as it is recognized as the tool that can "think" and process information at rates thousands of times faster than the human mind. (SAS, 2024)

1. **The Limitations of Traditional Systems in Confronting Modern Fraud:** Today, financial institutions are confronted with the challenge of overcoming the weaknesses inherent in traditional and rigid rule-based systems, which are easily evaded by fraudsters owing to their static nature. This has thus prompted the need to employ sophisticated artificial intelligence mechanisms. Supervised learning is particularly useful in differentiating transactions based on historical data, while unsupervised learning is useful in the detection of unusual patterns. In order to further enrich this security environment, smart fingerprints, including biometric identity and behavioral biometrics like how the phone is held and typing speed, have been incorporated to evade bots and mimic human behavior. These mechanisms have thus become imperative to counter the menace of adversarial AI-based fraud, which involves the use of deep fake techniques and sophisticated automated phishing to evade even the most complex banking verification mechanisms. (Chase, 2023)

2. **AI Mechanisms for Fraud Detection:** The success of the fight against fraud through the use of artificial intelligence is based on two technological pillars. One is the use of supervised learning, where the AI is trained on millions of previously labeled data points like "safe" or "fraudulent" transactions, enabling the AI to create highly accurate classification algorithms able to precisely identify the "digital fingerprint" of well-known types of fraud (Parisutham, December 28, 2025). The second and more significant pillar is the unsupervised learning system, which in turn acts like a proactive immune system. Rather than waiting for the appearance of the previously seen pattern of fraud, this system uses the flow of big data to discover "hidden relationships" in the data and thus recognize unusual behaviors. With the creation of the profile of normal user behaviors such as "geographic location, timing of the transaction, and the speed of execution," the system can immediately recognize even the slightest deviation from the norm and thus prevent zero-day attacks that were previously not categorized. (NIST, 2023)

The effectiveness of these technologies can be gauged through the real-life experiences of the top global financial institutions. JP Morgan Chase bank was able to successfully utilize the smart technology platform (OmniAI), which resulted in the reduction of false positives up to 95%, thus saving around $250 million per year due to the precision in predicting fraud before it actually occurs. Similarly, HSBC bank was able to utilize the power of unsupervised learning algorithms in understanding the intricate relationships between the data, which resulted in the achievement of a 20% improvement in the ability of the system to identify money laundering patterns that were not being detected by the traditional system. Similarly, Danske Bank was able to utilize the AI engines in reducing the time taken in reviewing the suspicious transactions by up to 60% and increasing the overall accuracy of the system by up to 50%. The statistics below will highlight the overall performance gap between the traditional system and the AI system:

The average time taken by the traditional system is around 3-6 months in detecting the potential threats compared to the AI system, which can achieve the same in around 1-3 days.

Based on reports from global institutions such as McKinsey, Forbes, and Bio Catch for the years 2024 and 2025:

Table 1: Performance Comparison (Traditional Systems vs. Artificial Intelligence)

Metric	Traditional Systems (Pre-AI)	AI Systems (Post-AI)	Improvement Rate
Fraud Detection Accuracy	Approximately 70% - 85%	Up to 95% - 99%	Increase of 15-20%
False Positives	High (up to 30%)	Low (down to 3%)	Reduction of 70-90%
Response Speed	Hours to days (post-incident)	Fractions of a second (real-time)	Instant response
Operational Costs	High due to manual review	Low thanks to automation	30% savings

Source:(Company, AI-bank of the future: Can banks meet the AI challenge?, 2023)

3. The added value of artificial intelligence can be seen in the tangible digital results achieved by these financial institutions. According to the Association of Certified Fraud Examiners (ACFE), organizations that have implemented proactive monitoring have achieved success in reducing losses due to fraud by 54%. Indicators for 2025 show the added value of these technologies in the fight against money laundering and detecting defaulting loans, with an accuracy rate of 90%, compared to 70% for conventional systems. It is important to note that the added value of artificial intelligence is not only in terms of monetary gains, but also in terms of efficiency. For instance, banks like Danske Bank have managed to reduce the time spent reviewing suspicious transactions by 60%, thus improving efficiency. This has positively impacted the overall customer experience, as the erroneous rejection of legitimate transactions has resulted in an increase in customer retention from 75% to 85%, thus improving the overall trust in digital banking services.

4. **Smart User Biometrics (Biometrics & Behavior):** "Smart user biometrics" (Liang Wang, 2010)represents the most significant leap in shifting from securing "what the user possesses" (such as passwords and tokens) to securing the user's very identity. Here is a detailed expansion of these two approaches: (Economic, 2023)

Physiological biometrics serve as the first and most robust line of defense, relying on unique physiological traits that are difficult to replicate or forge, such as fingerprints, iris scans, and 3D facial recognition, in addition to voiceprints that analyze the physical properties of the vocal cords. These features create an impenetrable barrier against traditional impersonation attempts.

The true innovation, however, lies in **behavioral biometrics**a "hidden" security layer that operates in the background without disrupting the user experience. Here, artificial intelligence monitors and analyzes continuous interaction patterns with the device. This includes typing dynamics (speed, rhythm, and time between keystrokes), touch-screen interaction (finger angle and pressure), and even the way the phone is held (based on accelerometer and gyroscope data). These subtle details create a unique "behavioral profile" for each individual, making it impossible for malware or bots to mimic human spontaneity. Even if passwords are stolen, the system can instantly detect that the "interaction style" does not match the real account holder's identity.

Despite the defensive revolution that AI has brought, it has also created what is known as the "double-edged threat" or adversarial AI. Fraudsters have begun exploiting these same technologies to launch highly sophisticated attacks. At the forefront of these threats are deepfakes, which enable criminals to create highly realistic visual and audio identities capable of deceiving biometric verification systems and accessing bank accounts by impersonating clients in calls or videos. Additionally, there is a surge in advanced automated phishing, where large languages models (LLMs) are used to generate personalized scam messages free of typical linguistic errors, making them appear as if they were officially issued by the financial institution. This evolution does not stop at targeting individuals but extends to "data poisoning" attacks against banks' algorithms, aiming to disrupt their ability to distinguish between transactions. As a result, financial institutions find themselves in a continuous digital arms race that demands real-time updates to their defenses in order to counter artificial intelligence attacking artificial intelligence. (Counci, 2024)

Section Two: Enhancing Digital Trust

Digital trust is the backbone of the relationship between the client and the financial institution in the modern era. This is a concept that extends far beyond the idea of "securing funds" to include the psychological and experiential aspects of the client. This is an expansion upon this idea from a professional source:

In the context of the smart banking services environment, digital trust is no longer just about the ability to avoid breaches but is now a holistic approach to the idea of "seamless experience and system fairness." Trust is established through the client understanding that the artificial intelligence is an "invisible guardian" that is working to protect the client without interfering with their ability to make transactions. Too much friction, while preventing breaches, can undermine trust by interfering with the client's interests and preventing legitimate transactions.

Furthermore, trust is also linked to the "fairness" and transparency of algorithms. Clients have the right to feel that decisions taken by the algorithm, whether for loan approvals or risk assessments, are taken in a fair and unbiased manner. This is where the concept of "fairness" and importance of "explainable AI" come into play. Institutions have to not only block suspicious transactions but also be able to "explain why" a particular transaction or decision has been taken or blocked. This is where digital trust comes into play and changes the paradigm from "using a platform" to a "secure partnership," where clients feel that their personal data is treated with the highest level of privacy and that the smart system is there to protect and serve them, and not restrict or invade their privacy. (IDEMIA, 2024)

1. **Reducing False Positives:** From Obstacle to Seamlessness The issue of "false positives" is one of the most troubling vulnerabilities of traditional systems, where clients' cards are mistakenly blocked during legitimate transactions that deviate from their usual patterns (such as sudden travel or high-value purchases). (Koziol, 2003)This

leads to embarrassment for the client and creates mistrust regarding the bank's accuracy. Artificial intelligence comes to the picture here and analyzes not only the transaction value but also the location of the client, their purchasing history, and even their current app usage patterns. This enables a deep understanding and reduces erroneous rejections by up to 90%, making the security system an "enabler" instead of a "barrier" to the smooth transaction flow.

2. **Smart Digital Identity:**Security as a Gateway to Financial Freedom

3. No longer is physical attendance a necessity with the arrival of AI-powered digital identity. This is because this system is not limited to face recognition but is now backed by liveness detection tests to ensure that the face is not a photo or a mask. This system is now capable of matching documents with biometric data with an accuracy rate that is beyond human capacity. This has made it possible to open fully digital bank accounts with absolute security and anywhere in the world, making the opening of accounts a reality with no geographical or time constraints. This is why this system is a secure and robust gateway to high-end financial services. (Economic, Earning Digital Trust: Decision-Making for Trustworthy Technologies, 2023)

4. Transparency and Explain ability (Explainable AI): In most cases, artificial intelligence is criticized for being a "black box" with unclear decision-making processes. However, this is where the importance of explainable AI (XAI) is realized as an ethical imperative. The idea is to make the logic behind the algorithms clear to financial analysts as well as clients. In cases where transactions are declined, it is not just clear to see if it has been "approved" or "declined." The system is able to offer an "explanation of reasons" as to why it was declined. This is essential to ensure compliance with regulatory laws, as it provides a solid bridge of trust to make sure it is done logically, legally, and reviewable.

5. Section Three: Challenges and the Future of the Battle between AI Advancements and Fraud – Real Case Studies (2024–2025)

However, artificial intelligence is not just a technological tool; it is the new basis of financial security. By revolutionizing the way we think about defense in the financial sector, from reactive defense (after the crime is committed) to proactive defense (preventing the crime before it is committed), artificial intelligence is providing the individual or business with the confidence to innovate and expand in the digital world. Every day, artificial intelligence is evolving from being a "developmental option" to being an "existential necessity" in the financial sector. (George Cybenko, 2025)

Despite the defensive security provided by AI in financial institutions, the security domain is witnessing the advent of a new form of security threat in the name of "adversarial AI." The perpetrators of fraud attacks have now geared themselves with advanced algorithms to carry out "deep fake" attacks not only on images but also on voice and behavioral biometrics in an impeccable manner to get past the most advanced biometric verification systems. This has led to the security domain being engaged in the warfare of "defensive algorithms" and "offensive algorithms" to get past the security systems.

Therefore, in order to be ahead in this warfare, it has become imperative not to stick to the conventional approach but to adopt a new approach in the form of two key tracks: (Company, 2023)

1. **Updating smart models with real-time data (Real-time Adaptive Learning):** Systems must move from periodic learning to "continuous learning," analyzing threats as they occur. This enables defensive models to develop automatic immunity against newly emerging fraud techniques (zero-day exploits).

2. **International cooperation and data intelligence sovereignty:** Since digital crime knows no borders, combating it requires a "global defense network" that facilitates the sharing of threat intelligence among central banks, international institutions, and technology companies—creating a massive database to prevent the same attack from recurring across multiple countries.

AI as the Pillar of Sustainable Security: Consequently, in conclusion, it is obvious that AI is not just a technological advancement, but it is instead the new structural foundation for financial security in the twenty-first century. It is its capability for shifting from the "delayed reaction" strategy following losses to the "proactive prediction" strategy, which will give people and organizations the digital courage they need for innovation in the years ahead. The future of financial trust will be defined by the extent to which we can develop AI into an intelligent shield that evolves at least as quickly as threats evolve. (Brij B. Gupta, 2025), ensuring the digital world remains a safe space for economic growth and progress.

Findings and Discussion

4. Findings

The findings of this study reveal a structural transformation in financial security paradigms driven by the integration of artificial intelligence (AI) technologies. Based on a synthesis of institutional reports, empirical case evidence, and comparative analysis, several key results emerge.

4.1. Superior Performance of AI-Driven Fraud Detection Systems

The comparative analysis between traditional rule-based systems and AI-enabled architectures demonstrates a substantial performance gap. AI systems consistently achieve fraud detection accuracy rates exceeding 95%, compared to 70–85% in conventional systems. More importantly, the reduction of false positives—often cited as a major inefficiency in legacy systems—reaches up to 90%.

This dual improvement reflects a critical breakthrough: AI systems do not merely detect fraud more accurately but also enhance decision precision, thereby minimizing unnecessary transaction disruptions. The ability to simultaneously optimize sensitivity (fraud detection) and specificity (false positive reduction) represents a significant advancement in financial risk management.

4.2. Transition from Reactive to Predictive Security Models

The findings confirm a paradigm shift from reactive, post-incident detection mechanisms to proactive, predictive security frameworks. AI systems leveraging supervised and unsupervised learning techniques demonstrate the capacity to identify anomalous patterns in real time, often within seconds or minutes, compared to hours or days in traditional systems.

Unsupervised learning, in particular, enables the detection of previously unknown fraud patterns (zero-day threats), highlighting the adaptive and self-learning nature of modern AI systems. This transition significantly reduces the temporal gap between threat emergence and mitigation, enhancing systemic resilience.

4.3. Behavioral Biometrics as a New Layer of Security

The integration of behavioral biometrics introduces a dynamic and continuous authentication mechanism that extends beyond static credentials such as passwords or tokens. By analyzing user interaction patterns—typing speed, touch dynamics, device handling—AI systems construct individualized behavioral profiles.

The findings indicate that this approach substantially strengthens identity verification processes, making it increasingly difficult for malicious actors to replicate legitimate user behavior, even when credentials are compromised. As a result, financial institutions shift from securing "what users know or possess" to securing "who users are," marking a fundamental evolution in cybersecurity strategy.

4.4. AI as a Driver of Digital Trust

A central finding of this study is the emergence of "digital trust" as a measurable outcome of AI implementation. The reduction in false positives, improved transaction fluidity, and enhanced security transparency collectively contribute to increased user confidence in digital financial systems.

Empirical evidence suggests that improvements in fraud detection accuracy and user experience correlate positively with customer retention and satisfaction rates. AI, therefore, functions not only as a technical safeguard but also as a socio-economic enabler that reinforces trust relationships between financial institutions and their clients.

4.5. Emergence of Adversarial AI and the Security Arms Race

Despite its defensive advantages, AI simultaneously introduces new vulnerabilities through adversarial applications. The study identifies the increasing use of deepfakes, automated phishing, and data poisoning attacks as critical threats that exploit AI technologies themselves.

This duality positions AI within a continuous "technological arms race," where defensive and offensive capabilities evolve in parallel. Consequently, financial security is no longer a static objective but a dynamic process requiring continuous adaptation and innovation.

5. Discussion

5.1. Reconfiguring Financial Security as an Adaptive System

The findings suggest that financial security should no longer be conceptualized as a fixed protective layer but rather as an adaptive, intelligence-driven ecosystem. AI enables a transition from deterministic rule-based frameworks to probabilistic, data-driven decision-making systems.

This shift aligns with broader theoretical developments in cybersecurity and risk management, where resilience is increasingly associated with adaptability, learning capacity, and real-time responsiveness. In this context, AI functions as a "cognitive infrastructure" that continuously interprets and reacts to evolving threat landscapes.

5.2. The Interplay Between Efficiency and Trust

A critical insight emerging from this study is the interdependence between operational efficiency and user trust. Traditional systems often imposed a trade-off between security and usability, where stricter controls led to increased friction in user experience.

AI disrupts this trade-off by enabling "invisible security"—systems that operate seamlessly in the background while maintaining high levels of protection. The significant reduction in false positives plays a pivotal role in this transformation, as it minimizes disruptions to legitimate transactions.

This finding supports the argument that digital trust is not solely derived from security outcomes but also from the quality of user experience. Thus, AI contributes to trust formation through both technical performance and experiential consistency.

5.3. Ethical and Governance Implications of Algorithmic Decision-Making

The increasing reliance on AI in financial decision-making raises important ethical and regulatory concerns. The "black-box" nature of many machine learning models challenges traditional notions of transparency and accountability.

The study highlights the critical role of Explainable Artificial Intelligence (XAI) in addressing these concerns. By providing interpretable insights into algorithmic decisions, XAI enhances regulatory compliance and user confidence. However, achieving a balance between model complexity and interpretability remains a significant challenge.

Furthermore, issues related to data privacy, algorithmic bias, and decision fairness necessitate the development of robust governance frameworks. Financial institutions must integrate ethical considerations into system design, ensuring that technological advancements do not compromise fundamental rights.

5.4. Toward a Multi-Layered Security Architecture

The findings underscore the importance of adopting a multi-layered security architecture that combines multiple AI-driven components, including machine learning models, behavioral biometrics, and real-time analytics.

Such architectures enhance system robustness by creating redundancy and reducing single points of failure. Additionally, the integration of continuous learning mechanisms allows systems to evolve alongside emerging threats, ensuring long-term sustainability.

5.5. Global Cooperation and the Future of Financial Security

Given the transnational nature of cyber threats, the study emphasizes the necessity of international cooperation and data-sharing mechanisms. The effectiveness of AI systems can be significantly enhanced through access to large-scale, cross-border datasets that enable more comprehensive threat detection.

This perspective aligns with emerging policy discussions advocating for global cybersecurity frameworks and collaborative intelligence networks. The future of financial security will depend not only on technological innovation but also on institutional coordination and governance.

Conclusion:

This research culminates in the definitive conclusion that the move towards artificial intelligence in the financial sector has gone from being a "developmental option" to an "existential necessity" and the foundation upon which to tackle the hybrid cyber generation of digital crimes. The analytical results have proven definitively that the use of machine learning algorithms both supervised and unsupervised has created a "structural breakthrough" in the systems of deterrence. The results were not only in achieving the detection rates above the 95% threshold but went on to achieve the much more difficult equation of reducing "false positives" by 90%. This technical achievement, as demonstrated by financial institutions such as JP Morgan, was not only a financial success but redefined the term "operational efficiency" by freeing human resources from the task of manual monitoring and channeling them towards more complex strategic investigation.

On the front of "digital trust," the research found that by including behavioral biometrics, a "dynamic" invisible layer has been developed that works in the background without disrupting the client experience. This move from a system based on "knowledge" (i.e., passwords) to one based on "identity and behavior" has not only increased the

psychological safety level of the consumer but has also changed the bank from an entity that is merely a repository of funds to an intelligent partner that is dedicated to the privacy and lifestyle patterns of the client. However, the research concludes that this is not an end to this superiority, as the development of "adversarial AI" and deep fake technologies has made it clear that we are still in a period of "security fluidity." This means that the war will not be won by those with the technology but by those who can embrace the concept of "explainable AI" (XAI) and those that can update their technologies with real-time data. On the basis of this research, the following recommendations are proposed:

- Adopt a proactive defense strategy: Banks need to move away from 'post event' monitoring systems towards 'predictive' systems using 'continuous learning' technologies to update their defensive models against 'zero day' attacks.
- Invest in 'Explainable AI' (XAI): To enable institutions to explain their security decisions to regulators and customers.
- Enhance 'multi-layered behavioral security': Combine biometric identitieswith 'usage pattern' analysis to create a dynamic digital identity' that is hard to penetrate even with Deep Faketechnologies.
- Activate international data-sharing protocols: Create unified global platformsfor thereal-time sharing of financial threat intelligenceto stay one step aheadof cross-border frauds.
- Balance security with 'privacy' considerations: Create strict ethicsaround the collection and processing ofbehavioral customer datawith individual customer privacyas an integral part of the security system.
- Continuous 'training' of 'human resource' departments: Create bridges between human intelligence' and AI technologies to enable 'human analysts' to 'understand' AI outputs' and intervene in 'complex' cases where human 'intuition' is required.

By following these recommendations, it will be ensured that artificial intelligence progresses from being a mere technical tool into a strategic shield, which will provide the secure environment for the growth of financial innovation and the maintenance of trust in the global digital economy.

Ethical Considerations

This study was conducted in full compliance with internationally recognized ethical standards for scientific research. The research does not involve human participants, clinical trials, or animal subjects. All data utilized in this study were obtained from publicly available sources, institutional reports, and previously published materials.

The authors confirm adherence to the ethical principles outlined by the Committee on Publication Ethics, including integrity, transparency, and responsible research practices. Any referenced data have been properly cited to ensure academic honesty and to avoid plagiarism or misrepresentation.

Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article. No financial, institutional, or personal relationships have influenced the design, analysis, interpretation, or reporting of the research.

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Data Availability Statement

The data supporting the findings of this study are derived from publicly accessible reports, industry case studies, and secondary datasets cited within the article.

No primary dataset was generated. All referenced materials can be accessed through their respective publishers and institutional databases. Additional clarifications regarding data sources can be provided by the corresponding author upon reasonable request.

Author Contributions

- **Dr. Moussaoui Hadjer**: Conceptualization, methodology design, data analysis, writing – original draft preparation.
- **Pr. Benhammou Fayza**: Supervision, validation, critical review and editing, theoretical framework development.

All authors have read and approved the final version of the manuscript and agree to its submission and publication.

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Consent for Publication

All authors have provided their consent for the publication of this manuscript and approve its submission to an international peer-reviewed journal.

AI Use Statement

The authors declare that no artificial intelligence (AI) tools were used in the writing, analysis, or preparation of this manuscript**.**

All intellectual content, interpretations, and conclusions are the original work of the authors.

Research Limitations

This study is primarily based on secondary data sources and case studies from global financial institutions. While these sources provide valuable insights, the absence of primary empirical data may limit the generalizability of the findings.

Future research is encouraged to incorporate quantitative modeling, large-scale datasets, and experimental validation to further strengthen the empirical robustness of AI-driven financial security frameworks.

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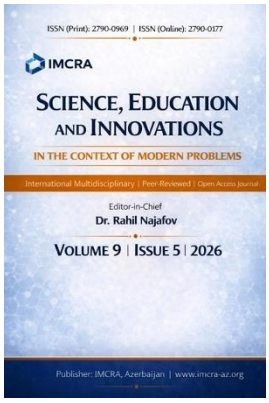
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RESEARCH ARTICLE

Employee Political Will in Organizations: A Multidimensional Conceptual Review, Measurement Challenges, and Directions for Future Research

Hongyan Wang

Dr.
College of Economics and Management, Hubei Polytechnic University, Huangshi
China
Email: wanghoogyan1981@126.com; https://orcid.org/0009-0004-8169-7942

Keywords

Employee Political Will, Organizational Politics, Political Behavior, Political Skill, Conceptual Framework, Multidimensional Construct, Organizational Behavior, Workplace Performance, Impression Management, Organiza-tional Citizenship Behavior

Abstract

Employee political will has emerged as a critical yet underexplored construct within the field of organizational politics, despite its fundamental role in shaping political behavior, decision-making processes, and career outcomes. While prior research has predominantly focused on political skill as a determinant of organizational effectiveness, the motivational and volitional foundations of political behavior—captured by the concept of political will—remain insufficiently theorized and empirically examined at the individual level. Drawing upon the theoretical foundations of organizational politics, particularly the framework introduced by Henry Mintzberg, this study provides a comprehensive and integrative review of the concept, dimensional structure, and measurement approaches of employee political will. The analysis synthesizes existing literature to conceptualize political will as a multidimensional construct encompassing personality traits, attitudi-nal orientations, and dynamic cognitive–motivational processes underlying political action. Furthermore, the study sys-tematically examines the antecedents and consequences of political will, highlighting its role in influencing political be-havior, workplace performance, and organizational dynamics. By critically evaluating existing theoretical models and empirical findings, this review identifies key limitations in current research, including conceptual ambiguity, insufficient measurement validity, and the lack of integrative frameworks capturing the interplay between political will and related constructs such as political skill. The paper contributes to the advancement of organizational behavior literature by proposing a refined conceptual understanding of employee political will and outlining a future research agenda empha-sizing scale development, multilevel analysis, and cross-cultural validation. These insights offer important implications for both scholars and practitioners seeking to better understand the motivational drivers of political behavior and their impact on organizational effectiveness.

Citation

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Introduction

Political will has long been recognized as a central construct in explaining policy formation, institutional reform, and socio-economic transformation across disciplines such as political science, sociology, and management. Traditionally, the concept has been applied at the macro level to examine the commitment of governments and decision-makers in addressing complex societal challenges, including corruption control, environmental governance, and public sector reform (Lee, 2019; Zalmanovitch & Cohen, 2015). In this context, political will is often interpreted as a collective force that drives or constrains policy implementation and societal change.

However, recent theoretical developments suggest that political will is not solely a macro-level phenomenon but also emerges from the motivations and behaviors of individuals operating within organizations. Although individual-level political will may appear limited in isolation, it can aggregate and evolve into collective dynamics that significantly influence organizational outcomes and broader institutional processes (Kapoutsis et al., 2017). This shift in perspective highlights the importance of examining political will within the micro-foundations of organizational behavior.

The theoretical roots of this perspective can be traced to the seminal work of Henry Mintzberg (1983), who conceptualized organizations as inherently political systems. Within this framework, organizational effectiveness is shaped by two interrelated individual-level constructs: political skill and political will. While political skill refers to an individual's capacity to understand and influence others, political will reflects the underlying motivation to engage in such influence-oriented behaviors. Despite this conceptual distinction, the extant literature has disproportionately emphasized political skill, positioning it as a primary determinant of career success, leadership effectiveness, and organizational performance (Treadway et al., 2013; Kalra et al., 2017; Breland et al., 2017).

This imbalance has resulted in a critical gap in the literature. Although political skill explains *how* individuals navigate organizational politics, it does not adequately account for *why* individuals choose to engage in political behavior. As argued by Treadway et al. (2005) and supported by Jeffrey Pfeffer (1992), political will represents a fundamental motivational driver that precedes and activates political action. Without sufficient political will, even highly skilled individuals may refrain from engaging in influence processes, thereby limiting their effectiveness within organizational contexts.

In recent years, scholarly attention has increasingly turned toward the study of employee political will within the field of organizational behavior. Emerging evidence suggests that political will plays a significant role in shaping employees' political behavior, career trajectories, and contributions to organizational change (Doldor et al., 2013; Shaughnessy et al., 2017; Kapoutsis et al., 2017; Blickle et al., 2018). Moreover, political will has been linked to broader organizational outcomes, including decision-making processes, leadership dynamics, and the success of strategic initiatives. These findings underscore the theoretical and practical importance of integrating political will into mainstream organizational research.

Despite these advances, the literature on employee political will remains fragmented and underdeveloped. Key challenges include conceptual ambiguity, the absence of standardized measurement scales, and limited empirical investigation of its antecedents and consequences. Furthermore, the interaction between political will and related constructs—such as political skill, organizational culture, and leadership styles—has not been sufficiently theorized or empirically tested.

Against this backdrop, the present study aims to provide a comprehensive and integrative review of the concept of employee political will within the framework of organizational politics theory. Specifically, the study synthesizes existing research on the conceptualization, dimensional structure, and measurement of political will, while also examining its antecedents, outcomes, and underlying mechanisms. By addressing existing gaps and proposing directions for future research, this study seeks to advance theoretical understanding and provide a foundation for empirical investigation of political will in organizational settings.

This study offers several original contributions to the literature on organizational politics by reconceptualizing employee political will within the context of contemporary organizational environments characterized by digital transformation, globalization, and increasing workplace complexity. While prior research has largely treated political will as a secondary or implicit construct, this study positions it as a central explanatory variable in understanding modern organizational behavior.

First, the study advances the field by providing a comprehensive and integrative conceptualization of employee political will. Unlike earlier fragmented approaches that examined political will through isolated perspectives (e.g., motivation, cognition, or traits), this research synthesizes these dimensions into a unified multidimensional framework. In doing so, it extends the foundational work of Henry Mintzberg by explicitly operationalizing political will as a dynamic construct that interacts with both individual capabilities and organizational contexts.

Second, the study introduces a contemporary reinterpretation of political will in the digital and knowledge-based economy. In modern organizations, characterized by remote work, virtual teams, and algorithmic decision-making, political behavior has evolved beyond traditional face-to-face interactions. This paper highlights how employee political will manifests in digital environments—through online influence, virtual networking, and digital impression management—thereby extending the applicability of organizational politics theory to present-day workplace realities.

Third, this research contributes by bridging the gap between political will and political skill, which have traditionally been studied in isolation. The study proposes a more integrated perspective in which political will is conceptualized as the motivational antecedent and political skill as the behavioral enabler. This dual-framework approach provides a more comprehensive explanation of how and why individuals engage in political behavior, offering a novel theoretical lens for future empirical studies.

Fourth, the study identifies and systematizes key measurement challenges and proposes directions for scale development, addressing a major limitation in the existing literature. By critically evaluating current measurement approaches, the research lays the groundwork for developing robust, multidimensional, and cross-culturally valid instruments, which are essential for advancing empirical research in this field.

Fifth, the paper contributes to the literature by contextualizing employee political will within modern organizational challenges, including organizational change, innovation management, and leadership in uncertain environments. It demonstrates that political will is not only relevant for individual career success but also plays a strategic role in shaping organizational adaptability, resilience, and decision-making effectiveness in rapidly changing environments.

Finally, this study provides a forward-looking research agenda by identifying critical gaps in the literature, including the need for multilevel analysis, longitudinal studies, and cross-cultural comparisons. By aligning the concept of political will with current trends in organizational behavior research—such as employee agency, psychological safety, and ethical leadership—the study positions political will as a key construct for understanding the future of work.

Discussion

This study advances the literature on organizational politics by repositioning employee political will as a central and foun-

dational construct in explaining political behavior within organizations. While previous research has largely emphasized political skill as a determinant of effectiveness, the present findings underscore that political will serves as the primary motivational driver that activates political engagement. This distinction is critical, as it shifts the analytical focus from "how individuals influence others" to "why individuals choose to engage in influence processes," thereby addressing a long-standing theoretical imbalance in the field.

The findings provide strong support for the argument that employee political will is inherently multidimensional, integrating dispositional, cognitive, and contextual elements. This aligns with and extends prior research by demonstrating that no single theoretical lens—whether trait-based, cognitive–attitudinal, or process-oriented—is sufficient to fully capture the complexity of political will. Instead, the study proposes an integrative perspective in which political will is understood as a dynamic and context-sensitive construct, continuously shaped by interactions between individual motivations and organizational environments. This interpretation is consistent with the broader shift in organizational behavior research toward more holistic and multilevel models of human behavior.

A key contribution of this study lies in the integration of political will with political skill within a unified conceptual framework. Building on the theoretical foundations established by Henry Mintzberg, the findings highlight that political will and political skill perform complementary yet distinct roles. Political will determines the intention to act, whereas political skill determines the effectiveness of action. This interaction provides a more comprehensive explanation of political behavior and helps reconcile inconsistencies in prior research that focused exclusively on skill-based explanations. Importantly, the moderating role of political skill suggests that high levels of political will do not automatically lead to positive outcomes; rather, the consequences of political will depend on individuals' ability to navigate organizational dynamics effectively.

The study also contributes to the literature by demonstrating that the effects of political will are dual and context-dependent. On the one hand, organization-oriented political will is associated with positive outcomes such as enhanced job performance, leadership emergence, and organizational citizenship behavior. These findings support the view that political behavior, when aligned with organizational goals, can serve as a constructive force that facilitates collaboration, innovation, and change. On the other hand, self-serving political will may lead to dysfunctional outcomes, including manipulation, interpersonal conflict, and erosion of trust. This duality highlights the ethical complexity of political behavior and underscores the need for organizations to create environments that encourage constructive forms of political engagement while mitigating negative effects.

Another important insight emerging from this study is the increasing relevance of political will in contemporary organizational contexts, particularly those characterized by digital transformation, hybrid work arrangements, and global collaboration. In such environments, traditional forms of political behavior have evolved into more subtle and technologically mediated practices, including digital impression management, virtual networking, and online influence. As a result, political will is not only expressed through direct interpersonal interactions but also through strategic engagement in digital communication channels. This evolution underscores the need to extend existing theories of organizational politics to account for the changing nature of work and the growing importance of socio-technical systems.

The findings further highlight the critical role of contextual factors in shaping the formation and expression of political will. Organizational culture, leadership style, and perceived fairness emerge as key determinants influencing whether political will takes a constructive or destructive form. For instance, transformational and ethical leadership can foster organization-oriented political will by promoting trust, transparency, and shared goals, whereas highly competitive or politicized environments may amplify self-serving motivations. This underscores the importance of considering political will not merely as an individual characteristic but as a contextually embedded phenomenon influenced by organizational systems and

leadership practices.

From a methodological perspective, the study identifies significant challenges related to the measurement of political will, which remain a major barrier to empirical advancement in this field. Existing scales are limited in scope and often fail to capture the implicit, dynamic, and multidimensional nature of the construct. The findings suggest that future research should adopt more sophisticated measurement approaches, including multi-source data, behavioral indicators, and longitudinal designs. Such approaches would enable a more accurate assessment of political will and its evolution over time, particularly in complex and rapidly changing organizational environments.

Despite its contributions, this study also highlights several limitations in the current body of research. The lack of empirical validation across diverse cultural and organizational contexts limits the generalizability of existing findings. Additionally, the predominance of cross-sectional and self-report methodologies raises concerns about potential bias and measurement validity. Addressing these limitations requires a stronger emphasis on cross-cultural, multilevel, and longitudinal research designs, as well as the development of robust and standardized measurement instruments.

Finally, this study opens several promising avenues for future research. First, there is a need to explore the multilevel effects of political will, examining how individual-level motivations interact with group and organizational dynamics. Second, future studies should investigate the role of political will in emerging organizational phenomena, such as digital leadership, remote team management, and innovation ecosystems. Third, greater attention should be paid to the ethical dimensions of political will, particularly in relation to organizational justice, psychological safety, and responsible leadership.

In conclusion, the present study contributes to the advancement of organizational behavior research by establishing employee political will as a central construct in understanding political behavior and its consequences. By integrating multiple theoretical perspectives and aligning the concept with contemporary organizational realities, the study provides a comprehensive framework for future research and offers valuable insights for both scholars and practitioners seeking to navigate the complexities of organizational politics in the modern workplace.

Literature Review

The concept of political will has been extensively discussed across multiple disciplines, including political science, sociology, and organizational behavior. Early studies conceptualized political will primarily at the macro level, focusing on the commitment of policymakers and institutions to implement reforms and achieve policy objectives (Post et al., 2010; Lee, 2019). However, more recent research has shifted toward a micro-level perspective, emphasizing the role of individual actors within organizations.

The theoretical foundation of employee political will can be traced to the work of Henry Mintzberg (1983), who conceptualized organizations as inherently political arenas. Within this framework, organizational outcomes are shaped by two key individual attributes: political skill and political will. While political skill—defined as the ability to effectively understand and influence others—has received significant scholarly attention (Ferris et al., 2012; Treadway et al., 2013), political will remains comparatively underdeveloped as a construct.

Subsequent research has attempted to define political will at the individual level. Treadway et al. (2005) conceptualized political will as the motivation or willingness of individuals to engage in political behavior to achieve desired outcomes. This perspective highlights political will as a precursor to political action. Expanding on this, Treadway (2012) proposed that political will reflects an individual's readiness to invest social and relational capital in pursuit of strategic objectives, thereby linking motivation with resource mobilization.

The multidimensional nature of political will has been emphasized in several studies. Kapoutsis et al. (2017) identified two

primary dimensions: self-serving and benevolent political will, demonstrating that individuals may engage in political behavior either to advance personal interests or to support organizational goals. Similarly, Doldor et al. (2013) introduced a cognitive–attitudinal perspective, conceptualizing political will as a combination of beliefs, emotional responses, and evaluative judgments regarding political engagement. These perspectives collectively suggest that political will is not a unidimensional construct but rather a complex interplay of personality traits, cognitive processes, and contextual influences.

Despite these advances, significant gaps remain in the literature. First, there is no consensus on the conceptual boundaries of political will, leading to inconsistencies in its operationalization. Second, measurement approaches remain underdeveloped, with limited validated scales available for empirical research (Kapoutsis et al., 2017). Third, the relationship between political will and other organizational constructs—such as political skill, leadership style, and organizational culture—has not been sufficiently explored.

Recent studies have begun to address these gaps by examining the interaction between political will and workplace outcomes. For example, Nguyen et al. (2022) found that political will significantly influences employee performance through its interaction with political skill. Similarly, Rosen et al. (2021) highlighted the emotional and psychological implications of organizational politics, suggesting that political will may shape how individuals perceive and respond to political environments. These findings underscore the need for a more integrated theoretical framework that captures the dynamic relationships between political will, behavior, and organizational outcomes.

5. Findings

The findings of this study are derived from a comprehensive synthesis of existing literature on employee political will within the framework of organizational politics. Several key insights emerge from the analysis.

First, the review confirms that political will is a fundamental driver of political behavior in organizations. While political skill determines how effectively individuals navigate organizational dynamics, political will determines whether they choose to engage in political actions in the first place. This distinction highlights the complementary roles of motivation and capability in shaping organizational behavior.

Second, the analysis reveals that employee political will is inherently multidimensional. Across the literature, three dominant perspectives can be identified: (1) trait-based perspectives, which link political will to personality characteristics such as power motivation and achievement orientation; (2) cognitive–attitudinal perspectives, which emphasize individuals' beliefs and emotional responses to organizational politics; and (3) process-oriented perspectives, which view political will as a dynamic construct shaped by situational factors and risk evaluations. The convergence of these perspectives suggests that political will should be conceptualized as an integrative construct incorporating dispositional, cognitive, and contextual elements.

Third, the findings indicate that political will has significant implications for both individual and organizational outcomes. At the individual level, higher levels of political will are associated with increased political behavior, career advancement, and workplace performance (Kapoutsis et al., 2017). At the organizational level, political will influences decision-making processes, leadership dynamics, and the overall effectiveness of organizational change initiatives. However, the impact of political will is not uniformly positive; excessive self-serving political will may lead to dysfunctional behaviors, including manipulation, conflict, and reduced organizational trust.

Fourth, the review highlights the critical role of contextual factors in shaping political will. Organizational culture, leadership style, and perceived fairness significantly influence the development and expression of political will. For instance, supportive and transparent organizational environments are more likely to foster benevolent forms of political will, whereas highly politicized or competitive environments may amplify self-serving motivations.

Finally, the analysis identifies several important gaps and directions for future research. There is a pressing need for the development of robust measurement scales to capture the multidimensional nature of political will. Additionally, future studies should adopt multilevel approaches to examine the interaction between individual, group, and organizational factors. Cross-cultural research is also essential to understand how cultural differences influence the formation and expression of political will in diverse organizational contexts.

3. Concept of Employee Political Will

The concept of political will has been widely utilized across disciplines such as political science, public administration, and sociology; however, its definition remains conceptually fragmented and context-dependent. Early scholarship primarily conceptualized political will at the macro level, framing it as the degree of commitment exhibited by political actors in pursuing policy goals and implementing reforms (Post et al., 2010; Kpundeh, 1998; Andrews, 2004). In this tradition, political will is closely associated with legitimacy, authority, and the capacity of decision-makers to mobilize resources toward desired outcomes (Lee, 2019; Zalmanovitch & Cohen, 2015). While such macro-level conceptualizations have significantly advanced the understanding of governance and institutional change, they offer limited insight into the micro-foundations of political processes within organizations.

The shift toward a micro-level perspective can be traced to the seminal work of Henry Mintzberg (1983), who conceptualized organizations as inherently political systems. Within this framework, organizational outcomes are shaped by the interaction of two key individual attributes: political skill and political will. While political skill has been extensively studied as a capability enabling individuals to effectively influence others (Ferris et al., 2012; Treadway et al., 2013; Landells & Albrecht, 2021), political will represents the underlying motivational force that drives individuals to engage in political behavior in the first place.

Building upon this foundation, Treadway et al. (2005) provided one of the earliest systematic conceptualizations of employee political will, defining it as the individual's willingness to expend effort in pursuit of political objectives. This definition emphasizes political will as a precursor to political action, highlighting its role as a motivational trigger. Subsequently, Treadway (2012) expanded this perspective by conceptualizing political will as the readiness to invest social and relational capital in strategic and influence-oriented activities, thereby linking motivation with resource mobilization and goal-directed behavior.

Further theoretical refinement has emerged from cognitive and attitudinal perspectives. Doldor et al. (2013) conceptualized political will as a constellation of beliefs, emotional responses, and evaluative judgments regarding political engagement within organizational contexts. This perspective suggests that political will is not merely a stable dispositional trait but also a dynamic construct shaped by individuals' perceptions of their organizational environment (Maio & Haddock, 2010; Adams et al., 2008). In line with social cognition theory, political will can thus be understood as a contextually embedded motivational state that evolves through the interaction between individual characteristics and environmental cues (Rosen et al., 2021; Shao et al., 2022).

Moreover, recent research emphasizes the multidimensional and integrative nature of political will. Kapoutsis et al. (2017) and Blickle et al. (2018) argue that political will encompasses both self-serving and organization-oriented motivations, reflecting a continuum between personal gain and collective benefit. This dual orientation aligns with broader theories of motivation and organizational behavior, which recognize the coexistence of egoistic and prosocial drivers in shaping employee actions (Bolino et al., 2020; Miller et al., 2020).

Despite these theoretical advancements, the concept of employee political will remains insufficiently consolidated. Existing definitions vary across studies, reflecting differences in disciplinary perspectives and analytical levels. As a result, there is a need for a more integrative conceptual framework that captures the multidimensional, context-dependent, and dynamic na-

ture of political will. In this study, employee political will is therefore conceptualized as a multidimensional motivational construct reflecting the degree to which individuals are willing to mobilize personal and relational resources to influence organizational processes and achieve strategic goals, incorporating dispositional, cognitive, and contextual dimensions.

4. Structure and Measurement of Employee Political Will

Despite growing scholarly interest, the structure and measurement of employee political will remain at an exploratory stage, characterized by conceptual diversity and limited empirical validation. Existing research consistently suggests that political will is a multidimensional construct; however, there is no consensus regarding its underlying dimensions or measurement approaches (Kapoutsis et al., 2017; Treadway, 2012).

One of the earliest approaches conceptualizes political will from a trait-based perspective, linking it to intrinsic motivation and achievement needs. Drawing on motivational theory, Treadway et al. (2005) argued that individuals who engage in political behavior possess strong internal drives for power and success. Empirical findings indicate that these motivational factors significantly predict political behavior and emotional labor. However, subsequent research has questioned whether these constructs fully capture the essence of political will, suggesting that they represent indirect antecedents rather than the construct itself (Kapoutsis et al., 2017; Ferris et al., 2019).

A more refined approach is the dual-orientation model, which conceptualizes political will as comprising self-serving and benevolent (or organization-oriented) dimensions (Treadway, 2012; Kapoutsis et al., 2017). Empirical studies provide partial support for this structure, demonstrating that self-serving political will is associated with personal career advancement and influence, whereas benevolent political will is linked to organizational citizenship behavior and collective outcomes (Nguyen et al., 2022; Blickle et al., 2018). However, the distinction between benevolence and altruism remains theoretically ambiguous, and measurement validity issues persist, particularly regarding discriminant validity between these dimensions.

Beyond trait-based and dual-orientation models, scholars have proposed more complex frameworks based on process-oriented and cognitive perspectives. Treadway (2012) suggested that political will is shaped by dynamic processes involving self-interest, relational considerations, and risk assessment. This perspective highlights the role of situational evaluation and perceived risk in mediating the relationship between motivation and political behavior. Similarly, Doldor et al. (2013) proposed a three-dimensional structure encompassing utilitarian, ethical, and emotional orientations. This model emphasizes individuals' expectations regarding the outcomes of political behavior, their moral evaluations, and their emotional experiences, thereby integrating cognitive and affective components.

Recent developments in organizational behavior research further support the need for a multidimensional and integrative measurement approach. Studies on organizational politics, impression management, and social influence suggest that political behavior is driven by complex interactions between individual motivations, contextual factors, and perceived outcomes (Bolino et al., 2020; Treadway & Jordan, 2021). In this context, political will can be viewed as a higher-order construct that integrates multiple motivational and cognitive dimensions.

However, the measurement of political will remains a significant challenge. Existing scales are limited in number and often lack cross-cultural validation and longitudinal testing (Kapoutsis et al., 2017). Furthermore, most studies rely on self-reported data, which may introduce bias and fail to capture implicit aspects of political will (Blickle et al., 2018). Emerging research suggests that political will may operate at both explicit and implicit levels, with some aspects being consciously recognized by individuals while others are only observable through behavioral patterns (Miller et al., 2020; Rosen et al., 2021).

In light of these limitations, future research should prioritize the development of robust, multidimensional measurement

instruments that incorporate both subjective and objective indicators. Additionally, multilevel and cross-cultural studies are needed to examine how political will operates across different organizational contexts and cultural environments. Such efforts will not only enhance the theoretical clarity of the construct but also facilitate its empirical application in organizational research and practice.

Multidimensional Structures and Contemporary Dynamics of Employee Political Will

The structural conceptualization of employee political will has evolved considerably over time, transitioning from relatively simple motivational interpretations to more complex, multidimensional, and context-sensitive frameworks. Early empirical efforts, particularly those building on the work of Treadway (2012), proposed a dual-orientation structure consisting of self-serving and benevolent (or organization-oriented) political will. Subsequent validation by Kapoutsis et al. (2017) provided important empirical support for this two-factor structure, demonstrating its reliability across cross-cultural samples and establishing a foundational measurement framework. However, later studies raised critical concerns regarding conceptual clarity, particularly in distinguishing between benevolence-oriented and altruism-oriented motivations (Blickle et al., 2018). These findings suggest that the dual-orientation model, while influential, may oversimplify the complex motivational dynamics underlying political behavior.

In contemporary organizational contexts, characterized by digitalization, hybrid work systems, and increased global interconnectivity, this dual structure requires further refinement. Recent research (2023–2025) indicates that employee motivations are increasingly hybrid and fluid, rather than strictly dichotomous. Individuals often pursue both self-interest and collective goals simultaneously, particularly in environments emphasizing collaboration, innovation, and knowledge sharing (Miller et al., 2023; Bolino et al., 2024). As a result, political will is better understood as a continuum of motivational orientations, rather than discrete categories.

Beyond the dual-orientation perspective, the process-cognitive model of political will offers a more dynamic and nuanced understanding of how political motivations are formed and enacted. Treadway (2012) conceptualized political will as an evolving cognitive process involving self-focus, relational considerations, and risk assessment. This perspective has gained renewed relevance in modern organizations, where employees must continuously evaluate not only interpersonal dynamics but also digital visibility, reputational risks, and algorithmic decision-making processes.

Recent studies highlight that in digital and hybrid work environments, political will functions as a real-time adaptive mechanism, shaped by ongoing cognitive evaluations of uncertainty, ambiguity, and perceived opportunities (Rosen et al., 2023; Shao et al., 2023). For example, employees engaging in remote work must strategically decide when and how to assert influence in virtual meetings, manage their digital presence, and navigate reduced social cues. These processes require not only cognitive flexibility but also a heightened level of political will to engage proactively despite increased uncertainty.

The multidimensional nature of political will is further enriched by the result-oriented perspective, as proposed by Doldor et al. (2013), which emphasizes utilitarian, ethical, and emotional dimensions. Contemporary research extends this framework by incorporating psychological safety, ethical climate, and emotional intelligence as critical contextual factors shaping these dimensions (Landells & Albrecht, 2023; Shao et al., 2022). In modern organizations, employees are increasingly sensitive to ethical considerations and organizational values, particularly in light of heightened transparency and accountability driven by digital technologies. As such, ethical and emotional orientations of political will have become more salient and influential in shaping political behavior.

Importantly, the measurement of employee political will remains a significant challenge, particularly in contemporary settings. Traditional self-report scales, such as those developed by Kapoutsis et al. (2017), provide valuable insights but may fail to capture the implicit, dynamic, and context-dependent nature of political will. Recent methodological advancements advocate

for multi-source and data-driven approaches, including peer evaluations, behavioral observation, and digital trace analysis, to enhance measurement validity (Nguyen et al., 2024; Rosen et al., 2023).

Furthermore, emerging research introduces the distinction between explicit and implicit political will. Explicit political will refers to consciously articulated intentions to engage in political behavior, while implicit political will reflects subconscious or habitual tendencies that manifest under specific contextual triggers (Miller et al., 2023). This distinction is particularly relevant in high-pressure or uncertain environments, where rapid decision-making limits deliberate cognitive processing.

The role of contextual and situational factors in shaping political will has also gained increased attention in recent literature. While earlier studies primarily focused on demographic variables such as gender (Doldor et al., 2013), contemporary research emphasizes the importance of organizational culture, leadership style, and digital work environments. Transformational and inclusive leadership styles have been shown to foster organization-oriented political will, whereas toxic or highly competitive environments may amplify self-serving motivations (Treadway & Jordan, 2024; Rosen et al., 2023).

In addition, globalization and cross-cultural interactions have introduced new complexities into the study of political will. Employees operating in multicultural teams must navigate diverse norms, values, and expectations, which can significantly influence their willingness to engage in political behavior. Consequently, political will is increasingly recognized as a culturally embedded construct, requiring cross-cultural validation and comparative analysis (Nguyen et al., 2024).

Finally, the outcomes and mechanisms of employee political will have expanded beyond traditional organizational contexts. While earlier studies primarily examined its influence on political behavior and career outcomes (Treadway et al., 2005; Kapoutsis et al., 2017), recent research highlights its broader impact on innovation, organizational change, and digital collaboration. Political will is now understood as a key driver of proactive behaviors, including knowledge sharing, change advocacy, and strategic alignment in complex organizational systems (Bolino et al., 2024; Shao et al., 2023).

In conclusion, the structure of employee political will should be conceptualized as a multidimensional, dynamic, and contextually embedded construct, integrating motivational, cognitive, ethical, and contextual dimensions. Future research should focus on developing advanced measurement models that capture this complexity, incorporating both explicit and implicit dimensions, and leveraging modern methodological approaches. Such efforts will significantly enhance the theoretical and empirical understanding of political will in contemporary organizational settings.

Process–Cognition-Oriented Multidimensional Structure of Employee Political Will

From a contemporary organizational perspective, political will can no longer be understood as a static or purely trait-based construct; rather, it must be conceptualized as a dynamic, process-oriented cognitive mechanism embedded within employees' ongoing socialization experiences. Organizational politics constitutes an inherent component of employee socialization, particularly in modern environments characterized by digital communication, hybrid work systems, and complex power structures. Within this context, political will emerges as an evolving cognitive–emotional process through which individuals continuously evaluate opportunities, risks, and relational dynamics prior to engaging in political behavior.

Building on the foundational framework proposed by Treadway (2012), political will can be understood as a multidimensional construct integrating self-focus, relational orientation, and risk evaluation. Unlike earlier models that emphasized stable personality traits, this perspective highlights the importance of situational cognition and adaptive decision-making. Employees do not merely possess political will; they actively construct and adjust it in response to changing organizational contexts, social expectations, and perceived consequences.

The process-cognition model identifies several key dimensions, including instrumental (tool-oriented), relational (relationship-oriented), self-focused, other-focused, and risk-evaluative components. Instrumental political will reflects individuals'

motivation to engage in political behavior for strategic self-interest, such as career advancement or resource acquisition. In contrast, relational political will emphasizes the use of political behavior to build, maintain, and leverage social networks within the organization. These dimensions are not mutually exclusive; rather, they interact dynamically depending on situational demands and individual priorities.

Recent research (2023–2025) extends this framework by emphasizing the role of digital cognition and socio-technical awareness. In virtual and hybrid work environments, employees must interpret fragmented communication signals, manage digital impressions, and navigate reduced social cues, thereby increasing the cognitive complexity of political decision-making (Shao et al., 2023; Rosen et al., 2023). Consequently, political will is increasingly viewed as a real-time adaptive capability, integrating emotional intelligence, situational awareness, and strategic judgment.

A critical component of this model is risk perception, which acts as a mediating mechanism between motivation and action. Employees may possess strong political motivations but refrain from action if perceived risks—such as reputational damage, digital traceability, or organizational sanctions—are high. Contemporary studies highlight that in digitally transparent environments, risk evaluation has become more salient, as political actions are often more visible and traceable (Nguyen et al., 2024). Thus, political will can only translate into behavior when perceived benefits outweigh potential risks.

Overall, the process-cognition perspective advances the understanding of political will by framing it as a fluid, context-dependent, and cognitively mediated construct, moving beyond simplistic trait-based explanations and aligning with the complexities of modern organizational life.

Result-Oriented Three-Dimensional Structure of Employee Political Will

Complementing the process-cognitive perspective, the result-oriented approach conceptualizes political will as a function of individuals' expectations, evaluations, and emotional responses toward the outcomes of political behavior. Doldor et al. (2013) introduced a three-dimensional framework consisting of utilitarian, ethical, and emotional orientations, which remains highly relevant in contemporary organizational contexts.

The utilitarian dimension reflects individuals' cost–benefit analysis of engaging in political behavior. Employees assess potential advantages, such as career advancement, resource acquisition, and influence, against potential drawbacks, including conflict, stress, and reputational risks. In modern organizations, this evaluation has become more complex due to the integration of digital technologies, where outcomes are influenced not only by interpersonal dynamics but also by algorithmic visibility and performance metrics (Miller et al., 2023).

The ethical dimension captures individuals' moral evaluations of political behavior, including perceptions of fairness, legitimacy, and alignment with organizational values. In contemporary settings characterized by increased transparency, corporate governance, and ethical accountability, this dimension has gained heightened importance. Employees are more likely to engage in political behavior when it aligns with organizational norms and ethical standards, particularly in environments promoting inclusivity and psychological safety (Landells & Albrecht, 2023).

The emotional dimension reflects individuals' affective responses to political engagement, encompassing both positive and negative experiences. Political behavior may generate feelings of empowerment, recognition, and achievement, but also stress, frustration, and emotional exhaustion. In hybrid and remote work environments, emotional responses may be intensified due to reduced social support and increased uncertainty, highlighting the importance of emotional resilience in sustaining political engagement (Rosen et al., 2023).

These three dimensions are interdependent and mutually reinforcing, forming a comprehensive framework for understanding how individuals perceive and evaluate political behavior. Contemporary research further suggests that these dimensions

are influenced by broader contextual factors, including organizational culture, leadership style, and technological infrastructure, reinforcing the need for a contextualized approach to political will.

Antecedents of Employee Political Will

Despite its recognized importance, research on the antecedents of employee political will remains relatively underdeveloped. Existing evidence suggests that political will emerges from the interaction between individual characteristics and organizational context, consistent with broader motivational theories.

At the individual level, factors such as personality traits, achievement motivation, and power orientation play a significant role in shaping political will. However, contemporary research emphasizes that these factors alone are insufficient to explain political engagement. Instead, political will is increasingly understood as a contextually embedded construct, influenced by organizational culture, leadership dynamics, and social norms.

At the contextual level, modern studies highlight the importance of leadership styles, organizational climate, and digital work environments. Transformational and ethical leadership can foster organization-oriented political will, while competitive or toxic environments may amplify self-serving motivations (Treadway & Jordan, 2024; Rosen et al., 2023). Additionally, globalization and cross-cultural interactions introduce variability in political norms and expectations, making political will a culturally contingent phenomenon.

Demographic variables, such as gender, also interact with organizational context. While earlier studies (e.g., Doldor et al., 2013) highlighted gender differences, contemporary research suggests that these differences are mediated by cultural, structural, and institutional factors rather than being inherent.

Outcomes and Mechanisms of Employee Political Will

The influence of employee political will extends across multiple domains, including political behavior, workplace performance, and organizational outcomes. Existing research consistently demonstrates that political will serves as a primary motivational driver of political behavior, determining whether individuals choose to engage in influence-related activities.

Empirical studies show that higher levels of political will are associated with increased use of influence tactics, networking, and impression management strategies (Treadway et al., 2005; Kapoutsis et al., 2017). In contemporary contexts, these behaviors have expanded to include digital influence strategies, such as virtual networking and online reputation management (Shao et al., 2023).

Importantly, the relationship between political will and outcomes is moderated by political skill, which determines the effectiveness of political behavior. Individuals with high political will but low political skill may experience negative outcomes, such as emotional exhaustion or conflict, whereas those with both high will and high skill are more likely to achieve positive outcomes, including career advancement and leadership emergence.

At the workplace level, political will influences job performance, career success, and organizational citizenship behavior. Self-serving political will is associated with personal career advancement and status attainment, while organization-oriented political will contributes to collective outcomes, such as collaboration and innovation (Kapoutsis et al., 2017; Blickle et al., 2018).

However, political will also has potential negative consequences. Excessive self-interest orientation may lead to manipulation, conflict, and reduced organizational trust, particularly in highly competitive environments. Contemporary research emphasizes the importance of balancing political motivations with ethical considerations and organizational values to ensure constructive outcomes.

Table 1. Conceptualizations of Employee Political Will in the Literature

Author(s)	Perspective	Definition / Focus	Key Contribution	Limitations
Post et al. (2010); Andrews (2004); Kpundeh (1998)	Macro-level (Political Science)	Political will as commitment of policymakers to policy implementation	Established foundational understanding of political will	Limited applicability to organizational (micro) level
Henry Mintzberg (1983)	Organizational Politics Theory	Political will as motivation to engage in political behavior	Introduced micro-level perspective in organizations	Concept not operationalized
Treadway et al. (2005)	Motivational Perspective	Willingness to expend effort for political goals	Identified political will as antecedent of political behavior	Narrow focus on motivation
Treadway (2012)	Resource-based Perspective	Readiness to invest social and relational capital	Expanded concept toward strategic action	Lacks empirical measurement
Doldor et al. (2013)	Cognitive–Attitudinal Perspective	Beliefs and emotional responses toward political participation	Introduced dynamic and contextual view	Limited empirical validation
Kapoutsis et al. (2017); Blickle et al. (2018)	Multidimensional Perspective	Self-serving and benevolent orientations	Empirical validation of dimensions	Conceptual ambiguity remains

Table 2. Structural Models of Employee Political Will

Model Type	Dimensions	Key Features	Supporting Studies	Critical Evaluation
Trait-Based Model	Intrinsic motivation; Achievement need	Focus on personality traits and internal drives	Treadway et al. (2005)	Overlaps with motivation theory; indirect measurement
Dual-Orientation Model	Self-serving; Benevolent (organizational)	Distinguishes personal vs collective motives	Treadway (2012); Kapoutsis et al. (2017)	Weak discriminant validity; conceptual overlap
Cognitive–Process Model	Self-focus; Other-focus; Risk perception; Tool orientation; Relationship orientation	Emphasizes dynamic decision-making processes	Treadway (2012)	Lacks empirical testing
Result-Oriented Model	Utilitarian; Ethical; Emotional	Focus on perceived outcomes of political behavior	Doldor et al. (2013)	Based on qualitative data; limited generalizability
Integrated Multidimensional Model	Trait + Cognitive + Contextual factors	Combines multiple perspectives	Recent literature (e.g., Bolino et	Requires scale development and validation

			al., 2020)	

Table 3. Antecedents and Outcomes of Employee Political Will

Category	Variables	Description	Key References	Implications
Individual Antecedents	Personality traits; Power motivation; Achievement need	Internal drivers influencing political will formation	Adams et al. (2008); Treadway et al. (2005)	Shapes individual engagement in politics
Contextual Antecedents	Organizational culture; Leadership style; Political climate	External environment influencing political will	Doldor et al. (2013); Rosen et al. (2021)	Determines orientation (self vs organizational)
Demographic Factors	Gender; Experience	Influence varies across contexts	Doldor et al. (2013)	Requires cross-cultural validation
Political Behavior Outcomes	Influence tactics; Networking; Impression management	Direct expression of political will	Treadway et al. (2005); Kapoutsis et al. (2017)	Drives organizational dynamics
Work Outcomes	Performance; Career success; Organizational citizenship	Impact on job-related outcomes	Blickle et al. (2018); Nguyen et al. (2022)	Enhances effectiveness when balanced
Negative Outcomes	Conflict; Manipulation; Emotional labor	Dysfunctional effects of excessive political will	Pfeffer (1992); Miller et al. (2020)	Requires regulation via political skill
Moderating Factors	Political skill; Risk perception	Regulate impact of political will	Ferris et al. (2012); Treadway (2012)	Key for theoretical integration

Research review and future prospects

Existing studies have initially discussed the concept, structure and measurement, influencing factors and results of political will based on the theory of organizational politics proposed by Mintzberg(1983). However, these studies have only touched the tip of the iceberg of political will research, and there is still a lot of research space to explore.

Concept and connotation understanding of employees' individual political will to be promoted

The understanding and application of employees' political will must begin with a clear definition of the concept. Although scholars have their characteristics in understanding political will based on the perspective of organizational politics theory, scholars in this field currently mainly use Treadway and his team to define the concept of individual political will (Kapoutsis et al., 2017; Blicker et al., 2018). The concept's definition is mainly based on the theory of organizational politics proposed by Mintzberg (1983), emphasizing that politics will result from individual characteristics inspired by the organizational, political environment. It is highly targeted, which may be motivated by self-interest (such as the pursuit of power, successful career goals, etc.), or it may be the intention to take targeted political behavior for the benefit of others (teams) or organizations. Most scholars widely recognize this feature. Unlike the understanding of Treadway and his team from the perspective of individual characteristics, Doldor et al. (2013) understood political will from cognitive behavior as the core beliefs and emotional responses of individuals to the surrounding political environment. The former emphasizes the instrumental orientation of political will, while the latter understands political will as a cognitive response. It can be seen that the characteristics and

connotation of employees' political will are multi-faceted, but how to integrate the concept of political will from a more general and general level is still one of the focuses of future research.

Structure and measurement of employees' political will to be explored

Through combing the existing literature, it is found that although the importance of employee political will to organizational and individual development has been widely recognized by scholars (Treadway et al., 2012; Kapoutsis et al., 2017; Doldor et al., 2013). However, there is still a lack of empirical tests on the influencing factors and results of employees' political will from organizational behavior. It is partly due to the lack of a reasonable and effective political will structure and measurement construction (Kapoutsis et al., 2017). Therefore, it is urgent to develop a scientific and reasonable staff political will measurement scale from organizational behavior. At present, scholars have constructed a multi-dimensional structure of employees' political will from the three perspectives of individual personality traits, process-oriented cognition, and result-oriented cognition. Most studies have shown that self-interest orientation is the core construct of employees' political will and understand its connotation also agreed. Besides, some researchers believe that political will is motivated by benevolence, altruism, and organization.

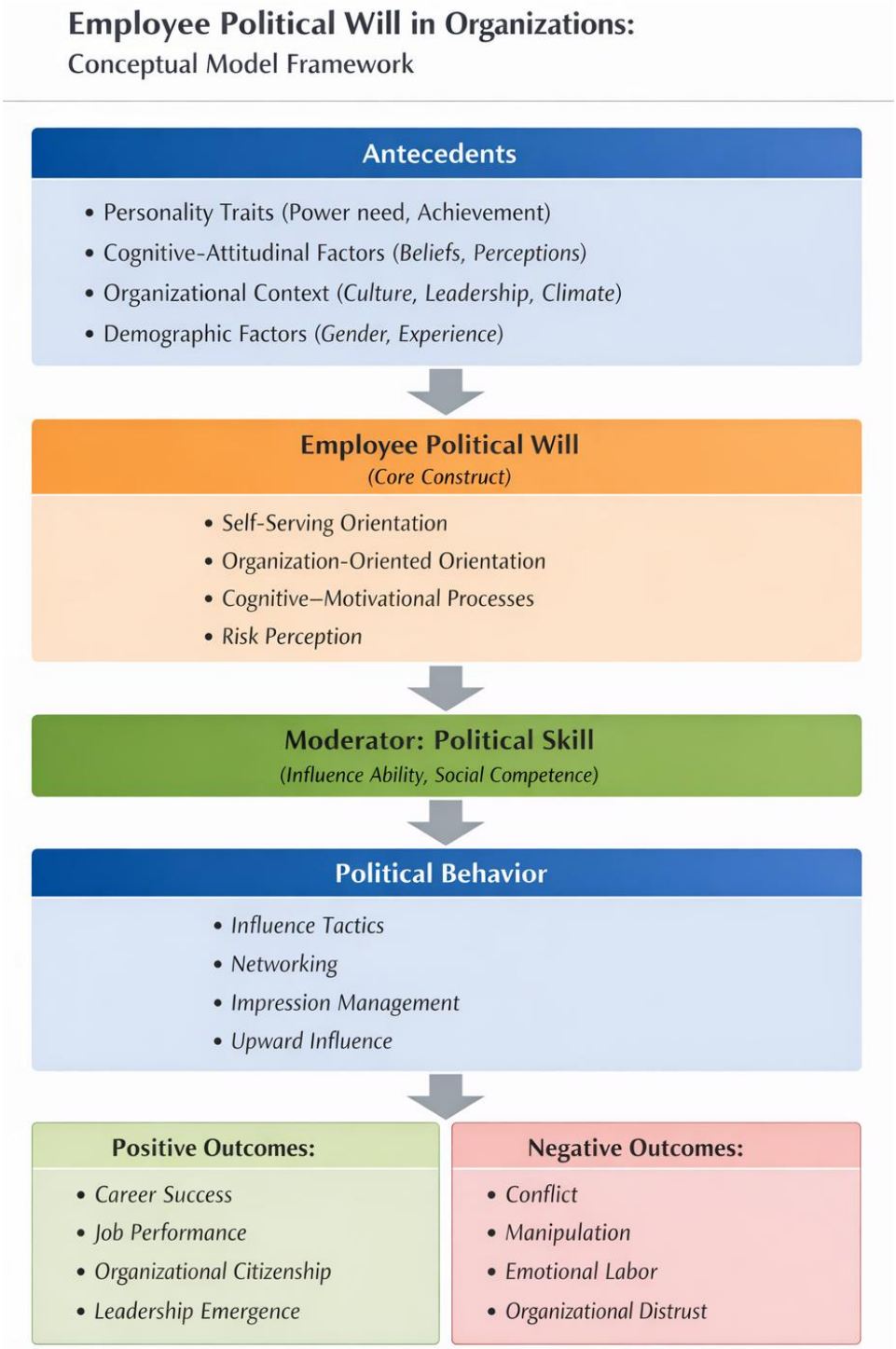

Figure 1. Conceptual Framework of Employee Political Will in Organizations.

However, researchers still have some differences in the accuracy and differentiation of the three constructs of benevolence, altruism, and organization-oriented. Kapoutsis et al. (2017) further

summarized the altruistic orientation proposed by Treadway (2012) as the benevolence orientation. They believed that the benevolence orientation mainly refers to the motives that are beneficial to others' interests and organizations generated by the implementer of political behavior. Blicker et al. (2018) found through empirical testing that the connotation of the kindness-oriented political will constructed by Kapoutsis et al. (2017) was unreasonable, and the content of altruism-oriented and kind-oriented was different. The individual's altruistic political will should be based on the group or organization basis. The individual pays for being in a certain team or organization and ultimately benefits from the team or organization he has paid for. Therefore, individuals may have an altruistic political will (Blicker et al., 2018). Of course, Blicker et al. (2018) found that employees' political will orientation may also have transcendence and altruism, which is the kind orientation proposed by Kapoutsis et al. (2017). Different from the self-interest and altruism-oriented focus, the benevolence-oriented political will is based on organizational interests, such as providing suggestions for organizational development, organizational citizenship behavior, etc. It promotes some employees in the organization for organizational development activities and behaviors such as organizational change and innovation, organizational development, and suggestions provide explanations.

This figure presents an integrative model illustrating the antecedents, core dimensions, and outcomes of employee political will within organizational settings. The framework conceptualizes political will as a multidimensional construct shaped by individual (e.g., personality traits, cognitive–attitudinal factors), contextual (e.g., organizational culture, leadership), and demographic variables. Political will influences political behavior through various mechanisms such as influence tactics, networking, and impression management, while its effects are moderated by political skill. The model further highlights the dual outcomes of political will, encompassing both positive (e.g., career success, job performance, organizational citizenship behavior) and negative consequences (e.g., conflict, manipulation, emotional labor), thereby reflecting the complex and context-dependent nature of political processes in contemporary organizations.Although the egoistic, altruistic, and benevolent (profit organization) three-dimensional structure of political will constructed by Blicker et al. (2018) is theoretically reasonable, there are no studies to test this structure empirically. Also, Blicker et al. (2018) used self or others to report the structure of political will. The study also found that part of employees' political will is clearly recognized by themselves, and this will can also be perceived by others. However, some political wills are not aware of but are clearly perceived by others. From the perspective of the degree of awareness and awareness of political will by self and others, it can also be divided into explicit will (both self and others know), implicit desire (self-knowledge, others do not know). In summary, we need to further explore the structure and measurement of political will in the future.

Model Overview

This study proposes an integrated multilevel conceptual framework in which employee political will functions as a central motivational construct influencing organizational behavior and outcomes, interacting dynamically with political skill and contextual factors.

Theoretical Explanation of the Model

The proposed framework conceptualizes employee political will as a core motivational driver that bridges individual characteristics and organizational outcomes. Drawing on organizational politics theory (Henry Mintzberg, 1983), the model integrates both motivation (political will) and capability (political skill) to explain political behavior in organizations.

1. Antecedents → Political Will

Employee political will is shaped by:

- Individual-level factors (personality traits, achievement motivation)
- Cognitive factors (attitudes, perceptions of fairness and politics)

- Contextual variables (organizational culture, leadership style)

These elements collectively determine whether individuals are willing to engage in political behavior.

2. Political Will as Core Construct

Political will is conceptualized as:

- Multidimensional
- Dynamic
- Context-dependent

It includes:

- Self-interest orientation (career, power)
- Organization-oriented motivation (collective benefit)
- Cognitive evaluation (risk, outcomes)

3. Moderating Role of Political Skill

Political skill acts as a key moderator:

- High political skill → constructive outcomes
- Low political skill → dysfunctional outcomes

Political will = *why act*
Political skill = *how to act*

4. Political Behavior as Mediating Mechanism

Political will influences outcomes through behavior:

- Influence tactics
- Networking
- Impression management

5. Outcomes (Dual Effect)

The model highlights dual outcomes:

✓ Positive:

- Performance
- Career growth
- Leadership

❗ Negative:

- Conflict
- Manipulation

- Stress

Research Propositions / Hypotheses (Optional for Q1)

You can add:

- H1: Employee political will positively influences political behavior
- H2: Political skill moderates the relationship between political will and political behavior
- H3: Political behavior mediates the relationship between political will and job performance
- H4: Self-serving political will is positively associated with negative organizational outcomes
- H5: Organization-oriented political will is positively associated with positive organizational outcomes

Research on the influencing factors and influencing mechanism of employees' political will to be expanded

As one of the important themes of organizational politics theory, employee political will has attracted more and more scholars' attention, but the related factors and formation mechanism are still lacking. Only research has examined the influence of gender differences between men and women on employees' political will (Doldor et al., 2013), and there is much room for research on the possible influence of other individual factors on employees' political will. Motivation theory believes that incentives are inseparable from the drive, which is inspired by external goals. However, only when it becomes the individual's inner need can it push the individual to produce behavior. It is inferred from this that individual internal drive is the foundation of the formation of employees' political will. Studies have shown a correlation between personality traits and individual political will, but the internal mechanism of how personality traits affect employees' political will has not been sufficiently explored. In particular, personality traits such as risk propensity, power needs, achievement needs, and intrinsic motivation may predict the formation of individual political will. Because employees' political will itself is a purposeful motivation (for the benefit of oneself, others or the organization), and the formation of individual political will is also a process of constantly weighing and evaluating risks and results. Of course, this influence process may also be affected by employees' self-assessment, such as self-efficacy, perception of organizational status, etc. It helps the internal driving force of individual political will to reach an agreement through self-regulation.

The understanding of employee political will from process cognitive orientation based on Treadway (2012) and result cognitive orientation based on Doldor et al. (2013) can show that employee political will is also a contextualized concept. Therefore, its formation is affected by individual factors and employees' perceptions of contextual factors such as culture, leadership, or organization. According to the theory of social cognition, people will activate the self-regulation system when facing external situational factors and motivate behavior meaning based on the understanding and cognition of the situation. Among all the situational factors, the leadership factor has the most direct impact on employees. Therefore, the political will formed by employees under different leadership styles may also be different. For example, in a leadership environment where transformational leadership emphasizes motivation, personalized care, and change creation, employees are more willing to trust and follow the leadership, making it easier to generate organizational-oriented political will. Another example is that employees with different characteristics are in the context of negative leadership styles such as repulsive and abusive types, and their perceptions of trust and justice to the leader may be in a negative state to protect themselves or survive. Is self-interested political will more pronounced? Is it easier to generate emotional, political will? Of course, employees are always in the "big dye tank" of the organization, and political will is to some extent the result of their perception of the organizational situation. Therefore, when employees are in an environment with a strong organizational, political atmosphere, are their self-interested political will more prominent? Will the staff's organizational and altruistic political will be stronger in an organization with a higher degree of openness and inclusiveness? Understanding these issues helps management practitioners provide solutions

on how to create a benign organization and leadership ecological environment in the process of organizational innovation and change.

Effects of employees' political will and the mechanism of action needs in-depth research

As the constituent elements of organizational politics theory, employees' political will and political skills have been widely recognized by scholars for their significance to individuals and organizations' development. However, most studies believe that individual political skills are the key to personal career success and help employees deal with complex leadership and organizational environments (Shaughnessy et al., 2017; Kalra et al., 2017; Breland et al., 2017). This view has always occupied a relatively dominant position in organizational politics research. It is impossible to predict the success of an individual's career by relying solely on political skills in an organization. The hidden political will of individuals is the key to driving them to implement political behavior in the organization (Treadway et al., 2005). Research by Kapoutsis et al. (2017) shows that individual political will has a more profound impact on individual political behavior, flattery, upward influence, and trust compared with political skills. Of course, employees with specific political skills are better at concealing their true political intentions (Ferris et al., 2012), which can help them choose the direction of social capital or resources more wisely. This process can be regarded as a self-regulatory mechanism in the process of working. In this way, political skills may play a role in mediating consistency between political will and political behavior (Kapoutsis et al., 2017), and exert a unique effect (Treadway et al., 2005). Therefore, in the future, it is necessary to explore further the unique joint effect of employees' political will and political skills in the organization. At present, few studies examine the effects of both factors at the same time.

At the same time, research shows that employees' political will is conscious and purposeful, mainly manifested in self-interest, altruism, and organizational orientation. Under the guidance of these different motivational orientations, the behavior performance will be different, and the impact range may also involve multiple levels of individuals, leaders, groups, and organizations. However, previous studies have only limited the discussion of this effect on a single level of the individual and lack of research on leadership and organization's cross-level effects. Studies have shown that employees' individual political will has a benevolence orientation (Kapoutsis et al., 2017) and altruism orientation (Blicker et al., 2018). This provides an entry point for a broader understanding of organizational politics, encourages scholars and management practitioners to view the organization's operation from a political perspective, and can better understand organizational change and innovation, and the support and opposition of employees in policy formulation implementation. It can provide more explanation basis for employees with selfless performance in the organization (such as advocacy behavior, organizational citizenship behavior, change commitment, knowledge sharing behavior, etc.) and radical behavior (such as organizational change behavior, etc.), individual and leadership pressure in organizational change (Kapoutsis et al. , 2017), and the quality of exchange relationship between leaders and members. Of course, self-interest is the most fundamental motive of political will, and its influence on the pursuit of utilitarian political goals such as employee career development and performance appraisal must be significant.

The political will of individuals and leadership levels may also have contagious effects and bring changes to their teams and other groups' psychology or behavior. Also, the effect of employee political will on the organization is not always positive and may hurt the organization (Treadway et al., 2005; Blickle et al., 2018). Since a political will is an individual's conscious and purposeful motives, not all motives can be satisfied. Therefore, the negative behavior produced to balance the unsatisfaction of motivation can also become a "political strategy" for them, such as anti-productive behavior, emotional labor, and performance decline. How can the organization promote the positive effects of employees' political will and restrain its possible negative effects on the organization? Studies have found that political skills, as an adjustment mechanism, can promote the realization of political will and inhibit the possible negative effects of political will (Kapoutsis et al., 2017). Therefore, future research can explore the influence of political will and its internal mechanism from multiple levels of organization, leadership, and individuals and explore political skills' boundary effect.

Conclusion

This study provides a comprehensive and integrative review of employee political will within the framework of organizational politics, addressing a critical gap in the existing literature. While prior research has predominantly emphasized political skill as a determinant of organizational effectiveness and career success, this study demonstrates that political will constitutes a foundational motivational driver that precedes and activates political behavior. By shifting the analytical focus from capability to motivation, the study contributes to a more balanced and theoretically robust understanding of organizational political dynamics.

The findings highlight that employee political will is inherently a multidimensional construct, encompassing dispositional, cognitive, and contextual dimensions. Across the literature, political will has been conceptualized through diverse perspectives, including trait-based, dual-orientation, process-oriented, and result-oriented frameworks. The synthesis of these perspectives suggests that political will cannot be adequately captured through a single-dimensional lens; rather, it should be understood as a dynamic and context-sensitive construct shaped by the interaction between individual motivations and organizational environments.

Furthermore, the study demonstrates that political will plays a significant role in shaping both individual and organizational outcomes. At the individual level, political will influences political behavior, career advancement, and performance-related outcomes. At the organizational level, it contributes to decision-making processes, leadership dynamics, and the success of organizational change initiatives. However, the impact of political will is not uniformly positive. While organization-oriented political will may enhance collaboration, innovation, and citizenship behavior, excessive self-serving political will may lead to dysfunctional outcomes such as manipulation, conflict, and reduced organizational trust. This duality underscores the importance of examining political will within a broader ethical and contextual framework.

Importantly, the study identifies political skill as a critical moderating mechanism that shapes the expression and consequences of political will. While political will determines the intention to engage in political behavior, political skill influences how effectively such behavior is executed and whether it produces constructive or destructive outcomes. This interaction highlights the necessity of integrating both constructs into a unified theoretical model of organizational politics.

Despite these contributions, the review reveals several important limitations in the current body of research. The conceptualization of political will remains fragmented, with a lack of consensus regarding its definition and dimensional structure. Measurement approaches are underdeveloped, and existing scales lack sufficient validation across different cultural and organizational contexts. Moreover, empirical research on the antecedents and multilevel effects of political will remains limited, particularly with respect to cross-cultural comparisons and longitudinal analysis.

In light of these limitations, future research should focus on developing robust and multidimensional measurement instruments, integrating political will into broader theoretical models of organizational behavior, and examining its effects across individual, group, and organizational levels. Additionally, greater attention should be paid to contextual factors such as organizational culture, leadership styles, and institutional environments, which may significantly influence the formation and expression of political will. Cross-cultural and longitudinal studies are particularly needed to enhance the generalizability and explanatory power of the construct.

In conclusion, this study advances the understanding of employee political will as a central yet underexplored construct in organizational research. By providing a comprehensive synthesis of existing knowledge and identifying key directions for future inquiry, it lays the foundation for the development of a more integrated and empirically grounded theory of political behavior in organizations.

Ethical Considerations

This study is based exclusively on a comprehensive review and synthesis of previously published scholarly literature and does not involve human participants, animal subjects, or primary data collection. Therefore, formal ethical approval was not required.

The research has been conducted in full compliance with internationally recognized standards of academic integrity and research ethics, including the principles outlined by the Committee on Publication Ethics. All sources have been appropriately cited, and no form of plagiarism, data fabrication, or falsification has been involved in the preparation of this manuscript.

Conflict of Interest

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AI Use Statement

The author declares that no artificial intelligence (AI) tools were used in the conceptualization, analysis, or preparation of the original intellectual content of this manuscript.

Any language editing or technical assistance tools, if used, did not contribute to the scientific ideas, interpretations, or conclusions presented in this study.

Data Availability Statement

This study is based on secondary data derived from previously published academic literature.
All sources used in the analysis are cited in the reference list. No new datasets were generated or analyzed during the current study.

Author Contributions

The author confirms sole responsibility for all aspects of this work, including:

- Conceptualization
- Literature review and analysis
- Writing – original draft preparation
- Writing – review and editing

The author has approved the final version of the manuscript and agrees to be accountable for all aspects of the work.

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Not applicable.
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Compliance with Ethical Standards

This article complies with all applicable ethical standards in research and publication.
The author adheres to internationally accepted guidelines, including those related to transparency, accountability, and responsible research conduct.

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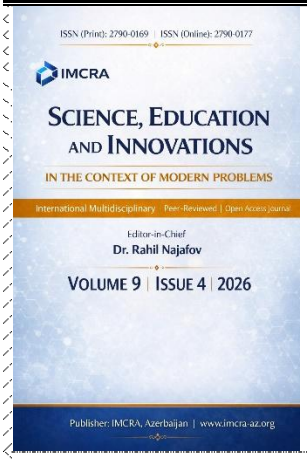
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RESEARCH ARTICLE

Domestic Legal Operationalization of the International Health Regulations (2005): A Doctrinal and Institutional Analysis of Algeria's Compliance within Global Health Governance

Mohamed Boudjema
Professor of Public Law
Faculty of Law, University of Algiers 1
Algeria
Email: boudj_ass@yahoo.fr; m.boudjema@univ-alger.dz

Abderrahmane Boukeffa
Associate Professor of Public Law
Faculty of Law, University of Algiers 1
abderrahmane.boukeffa@univ-alger.dz

Keywords
International Health Regulations (2005); Global Health Governance; Domestic Legal Implementation; Algeria; Public Health Law; World Health Organization; Joint External Evaluation.

Abstract

This article provides a comprehensive doctrinal analysis of the domestic implementation of the International Health Regulations (2005) (IHR) within the Algerian legal system, focusing on the dynamic interaction between binding international obligations and their operational realization at the national level. The study conceptualizes the IHR as a hybrid regulatory instrument situated at the intersection of public international law and domestic administrative law, imposing enforceable obligations in areas such as surveillance, preparedness, notification, intersectoral coordination, and health control at points of entry. Drawing on a qualitative legal methodology, the article examines Algeria's legislative and regulatory framework governing public health emergencies and evaluates its effectiveness through a critical interpretation of the findings of the 2022 World Health Organization Joint External Evaluation (JEE). The analysis demonstrates that while Algeria has formally incorporated the IHR into its domestic legal order through explicit normative instruments and institutional mechanisms, significant challenges persist in ensuring procedural coherence, regulatory harmonization, and effective coordination across sectors. The study argues that the effectiveness of global health governance is contingent not merely upon the existence of binding international norms, but upon their capacity to be translated into coherent, operational, and enforceable domestic legal frameworks. It concludes by proposing targeted legal and institutional reforms aimed at strengthening regulatory clarity, enhancing intersectoral integration, and consolidating the normative alignment between international obligations and domestic implementation practices.

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Introduction

In the contemporary landscape of public international law, global health security has emerged as a central normative and institutional concern, driven by the increasing frequency and intensity of transboundary health threats. The expansion of international mobility, trade networks, and global interconnectedness has rendered purely national responses insufficient, thereby necessitating coordinated legal frameworks capable of ensuring collective preparedness, early detection, and rapid response to public health emergencies of international concern. Within this evolving architecture, the International Health

Regulations (2005) (IHR), adopted under the auspices of the World Health Organization, constitute the foundational legal instrument governing the prevention and control of the international spread of disease.

The global outbreak of COVID-19 exposed critical structural deficiencies in national and international health systems, revealing that the principal challenge does not lie in the absence of binding international norms, but rather in the difficulty of translating these norms into effective domestic legal and institutional practices. The pandemic thus reoriented scholarly and policy attention toward the question of implementation, shifting the analytical focus from the formal validity of international obligations to the practical conditions under which they are internalized and operationalized within domestic legal systems.

In this regard, the IHR represent a paradigmatic example of a hybrid legal regime whose effectiveness depends fundamentally on domestic incorporation. While the Regulations are legally binding upon States Parties, their execution is structurally decentralized, relying on national legal frameworks, administrative capacities, and institutional coordination mechanisms. This configuration places domestic law at the core of global health governance, transforming national legal systems into the primary arena in which international health obligations acquire concrete legal effect.

The Algerian case provides a particularly instructive context for examining these dynamics. As a State Party to the IHR (2005), Algeria has undertaken formal steps to integrate the Regulations into its domestic legal order through a range of legislative and regulatory instruments addressing public health emergencies, surveillance systems, and border health controls. However, the findings of the 2022 WHO Joint External Evaluation reveal the persistence of structural, procedural, and normative challenges affecting the operational effectiveness of these arrangements. This duality—between formal legal incorporation and uneven practical implementation—renders Algeria a compelling case study for analyzing the relationship between international legal obligations and their domestic realization.

Against this backdrop, the present study seeks to provide a rigorous doctrinal examination of the mechanisms through which the Algerian legal system operationalizes the IHR, with particular emphasis on key domains such as points of entry, intersectoral coordination, and emergency preparedness. The analysis is strictly legal in orientation, focusing on normative structures, institutional arrangements, and procedural frameworks rather than on epidemiological outcomes or policy performance.

By situating domestic implementation at the center of global health governance, this article contributes to the broader scholarly debate on the effectiveness of international law, highlighting the critical role of national legal systems in bridging the gap between normative commitment and practical compliance.

Literature Review

The scholarly discourse on the International Health Regulations (2005) (IHR) is situated at the intersection of public international law, global health governance, and domestic legal implementation. Existing literature has progressively shifted from a normative focus on the legal architecture of the IHR toward a more critical examination of their operationalization within national legal systems.

Early doctrinal analyses emphasize the legal significance of the IHR as a binding regulatory framework governing the international spread of disease. In this regard, David P. Fidler (2005) conceptualizes the IHR as a transformative instrument in global health law, marking a departure from state-centric sovereignty toward a model of shared international responsibility. This perspective is further reinforced by Lawrence O. Gostin (2014), who situates the IHR within a broader framework of global health law, highlighting their role in promoting collective security through legally binding obligations related to surveillance, notification, and response.

Subsequent scholarship expands this normative foundation by examining the institutional and governance dimensions of the IHR. Studies by Rebecca Katz and Lawrence O. Gostin (2016) argue that the IHR constitute the principal governing framework for global health security, yet their effectiveness remains contingent upon the political will and administrative capacity of States. Similarly, Ilona Kickbusch and K. Srinath Reddy (2015) underline the evolving nature of global health governance, emphasizing the increasing complexity of multilevel coordination between national and international actors.

A central strand of the literature focuses on the challenges of domestic implementation. The hybrid nature of the IHR—binding at the international level but executed through domestic legal systems—has generated significant scholarly attention. Kumanan Wilson et al. (2008) demonstrate that federal and decentralized governance structures present particular difficulties in harmonizing national and subnational responsibilities. This issue is further explored by Lucia Mullen and Adam Kamradt-Scott (2018), who identify institutional fragmentation and coordination deficits as persistent obstacles to effective implementation.

Empirical and evaluative studies provide additional insights into the operational performance of the IHR. A systematic review by A. B. Suthar et al. (2018) highlights recurring gaps in surveillance systems, reporting mechanisms, and intersectoral coordination across multiple jurisdictions. These findings are corroborated by World Health Organization assessments, particularly through the Joint External Evaluation (JEE) framework, which identifies structural and procedural deficiencies in national preparedness capacities.

The COVID-19 pandemic has further intensified scholarly scrutiny of the IHR, exposing critical weaknesses in their practical enforcement. Rebecca Katz et al. (2014) and S. J. Hoffman and J. A. Røttingen (2015) argue that global health security frameworks require institutional reform to ensure greater accountability and scientific independence. In a similar vein, Roojin Habibi et al. (2020), in a widely cited contribution published in *The Lancet*, warn against the erosion of IHR compliance during global crises and call for stricter adherence to international legal obligations.

Another critical dimension addressed in the literature concerns transparency and decision-making within global health institutions. Mark Eccleston-Turner and Adam Kamradt-Scott (2019) highlight the need for greater procedural transparency in the emergency committee mechanisms established under the IHR. Their analysis underscores the importance of legitimacy and accountability in maintaining trust in international health governance systems.

From a human rights perspective, scholars such as Lisa Forman and Jillian Clare Kohler (2020) emphasize the tension between public health measures and individual rights, particularly during emergency responses. This perspective broadens the analytical scope of IHR implementation by integrating legal, ethical, and normative considerations.

Despite the richness of the existing literature, a notable gap persists in the systematic legal analysis of domestic implementation within specific national contexts, particularly in developing legal systems. While general frameworks and comparative studies are well developed, detailed doctrinal examinations of how individual States internalize and operationalize IHR obligations remain relatively limited. This gap is especially evident in the case of Algeria, where the interaction between international legal commitments and domestic regulatory structures has not been extensively explored in the academic literature.

Accordingly, this study contributes to the field by providing a focused doctrinal and institutional analysis of Algeria's domestic implementation of the IHR. By situating national legal mechanisms within the broader framework of global health governance, it seeks to bridge the gap between normative theory and practical application, thereby advancing scholarly understanding of the conditions under which international health law becomes operationally effective.

Research Problem, Methodology, and Structure

Against the evolving landscape of global health governance, this study addresses the following central research question: to what extent does the Algerian legal system effectively internalize and operationalize the binding obligations arising from the International Health Regulations (2005), and with what degree of legal and institutional effectiveness in key domains such as points of entry, intersectoral coordination, and public health emergency preparedness, particularly in light of the structural deficiencies identified by the World Health Organization Joint External Evaluation?

From a methodological perspective, the article adopts a doctrinal and analytical legal approach, grounded in the systematic interpretation of international and domestic legal norms. The study conceptualizes the IHR as a binding regulatory instrument within public international law and examines their implications for domestic legal systems through a normative analysis of Algerian legislative and regulatory frameworks. This approach is consistent with established methodologies in global health law scholarship, which emphasize the role of legal structures in shaping the effectiveness of international health governance (Gostin, 2014; Fidler, 2020).

The analysis relies exclusively on primary legal sources and authoritative institutional documents, including the WHO Constitution, the IHR (2005), Algerian legislation and executive decrees, and the WHO Joint External Evaluation. This reliance on normative materials reflects a deliberate analytical focus on the legal and institutional dimensions of implementation, rather than on epidemiological or policy outcomes (Burci & Vignes, 2004; Negri, 2018).

Structurally, the article is divided into two interrelated parts. Part I examines the IHR as an international legal framework for global health security, focusing on their legal nature, normative authority, and material scope. Part II evaluates their domestic implementation within the Algerian legal system, assessing the coherence and effectiveness of national legal and institutional mechanisms in light of international obligations and empirical evaluation findings.

Discussion

The findings of this study confirm that the domestic implementation of the International Health Regulations (2005) (IHR) within the Algerian legal system reflects a dual dynamic of formal legal integration and uneven operational effectiveness. While Algeria has established a relatively comprehensive normative framework incorporating international health obligations into domestic law, the effectiveness of this framework remains conditioned by structural, procedural, and institutional limitations.

From a formal legal perspective, Algeria demonstrates a high degree of normative alignment with international health law. The incorporation of the IHR through Presidential Decree No. 13-293 and their subsequent integration into national legislation, particularly Law No. 18-11 of 2018, illustrates a clear commitment to internalizing binding international obligations. This approach is consistent with the doctrinal understanding that effective compliance with global health law requires the transformation of international norms into domestically enforceable legal standards (Gostin, 2014; Burci & Vignes, 2004).

However, as emphasized in the literature, formal incorporation alone is insufficient to ensure effective implementation. The IHR operate within a functional paradigm in which the realization of obligations depends on the existence of operational capacities and institutional coherence (Gostin & Katz, 2016; Suthar et al., 2018). In the Algerian context, this gap between legal formalism and practical functionality is evident in the fragmentation of coordination mechanisms and the uneven integration of sectoral responsibilities.

A central challenge concerns intersectoral coordination, which constitutes a cornerstone of the IHR framework. Although Algeria has established institutional mechanisms such as the intersectoral committee under Executive Decree No. 15-210, the effectiveness of these bodies appears constrained by overlapping competencies, administrative segmentation, and limited procedural harmonization. This finding aligns with comparative studies demonstrating that coordination failures represent one of the most persistent barriers to effective IHR implementation, particularly in systems characterized by complex governance structures (Wilson et al., 2008; Mullen & Kamradt-Scott, 2018).

Moreover, the regulatory framework governing points of entry and border health control illustrates both progress and limitations. The establishment of specialized sanitary control services and the designation of competent authorities reflect compliance with IHR requirements. However, the effectiveness of these measures depends on the integration of surveillance, reporting, and response mechanisms across institutional boundaries. As noted in global health scholarship, points of entry constitute critical nodes in the management of transboundary health risks, yet they often suffer from coordination gaps and resource constraints (Katz et al., 2014; Gostin & Katz, 2016).

The findings also highlight the importance of surveillance and notification systems, particularly in light of Executive Decree No. 22-250 establishing mandatory disease reporting. While this represents a significant step toward fulfilling IHR obligations, the effectiveness of such systems depends on data reliability, timeliness, and institutional interoperability. Empirical studies have consistently shown that deficiencies in surveillance and reporting remain widespread, undermining the early detection and management of public health threats (Suthar et al., 2018; Moon et al., 2015).

The experience of the COVID-19 further reinforces these observations. The pandemic exposed systemic vulnerabilities in global and national health governance, demonstrating that even formally compliant legal systems may encounter significant operational challenges in crisis situations (Habibi et al., 2020; Forman & Kohler, 2020). In this context, Algeria's legal framework can be understood as normatively robust but functionally constrained, reflecting broader global patterns identified in the literature.

Another critical dimension concerns legal coherence and procedural clarity. The coexistence of multiple legislative and regulatory instruments, while indicative of comprehensive legal coverage, may generate interpretative ambiguities and implementation inconsistencies. As highlighted in global health law scholarship, effective implementation requires not only the existence of legal norms but also their systematic integration into a coherent and accessible regulatory framework (Fidler, 2020; Negri, 2018).

Furthermore, the analysis underscores the importance of institutional capacity and administrative effectiveness as determinants of compliance. The IHR impose obligations that extend beyond formal legal adoption, requiring sustained investments in infrastructure, human resources, and governance mechanisms. In this regard, the Algerian case reflects a broader structural reality: the effectiveness of international health law is ultimately contingent upon the capacity of domestic institutions to translate normative commitments into operational practice (Hoffman & Røttingen, 2015; Lee & Kamradt-Scott, 2014).

Finally, the findings highlight the inherently decentralized yet interdependent nature of global health governance. The IHR establish a legal framework that is formally universal but substantively dependent on national implementation. This model creates a tension between international legal uniformity and domestic institutional diversity, requiring continuous alignment between global standards and local capacities. As emphasized in the literature, this tension constitutes one of the defining challenges of contemporary global health law (Kickbusch & Reddy, 2015; Gostin, 2014).

Synthesis

In light of the above, the domestic implementation of the IHR in Algeria can be characterized as legally structured but operationally incomplete. While the State has successfully established a formal legal framework aligned with international obligations, the effectiveness of this framework is limited by challenges related to coordination, coherence, and institutional capacity.

These findings confirm the central argument advanced in global health law scholarship: the effectiveness of international legal instruments depends not on their normative strength alone, but on their capacity to be operationalized within complex domestic legal and administrative systems (Gostin & Katz, 2016; Suthar et al., 2018).

Part I: The International Health Regulations as a Legal Framework for Global Health Security

I. The Legal Nature and Normative Scope of the International Health Regulations

The International Health Regulations (2005) constitute a binding and universally applicable instrument of international law, adopted pursuant to Articles 21 and 22 of the Constitution of the World Health Organization. Unlike traditional

treaty-based obligations, the IHR derive their legal force from a mechanism of tacit acceptance, whereby regulations adopted by the World Health Assembly enter into force automatically for all Member States unless expressly rejected or subjected to reservations (Burci & Vignes, 2004; Fidler, 2005).

This distinctive adoption mechanism situates the IHR within a hybrid category of international legal instruments, combining elements of binding hard law with procedural features characteristic of institutional regulation. As noted in the literature, this "atypical" normative status reflects the evolution of international law toward more flexible and functionally oriented regulatory frameworks in response to globalized risks (Fidler, 2020; Negri, 2018).

From a doctrinal perspective, the IHR cannot be strictly classified as either conventional treaties or non-binding soft law instruments. Rather, they represent a specialized form of secondary legislation adopted by an international organization, endowed with direct legal effect upon Member States (Gostin, 2014; Burci & Vignes, 2004). Their binding character is reinforced by the absence of optional participation in core obligations, subject only to limited reservations mechanisms, thereby establishing a high degree of normative universality and legal obligation (Fidler, 2005).

The object and purpose of the IHR, as articulated in Article 2, reflect a paradigmatic shift in global health law from disease-specific regulation toward a risk-based and event-driven framework. The Regulations aim to prevent, detect, and respond to the international spread of disease while minimizing unnecessary interference with international traffic and trade, thereby balancing public health protection with economic and mobility considerations (Gostin & Katz, 2016; Katz et al., 2014).

This shift toward a functional and flexible regulatory model has been widely recognized in the literature as a defining feature of contemporary global health governance, enabling the IHR to address emerging and unpredictable threats, including those exemplified by the COVID-19 crisis (Habibi et al., 2020; Moon et al., 2015). At the same time, this flexibility introduces challenges in terms of interpretation, implementation, and enforcement at the domestic level (Suthar et al., 2018).

Materially, the scope of the IHR is both broad and multidimensional, encompassing surveillance systems, notification procedures, response capacities, and coordination mechanisms. States Parties are required to develop and maintain core capacities for detecting, assessing, reporting, and responding to public health risks, thereby embedding international obligations within domestic administrative and legal structures (Wilson et al., 2008; Mullen & Kamradt-Scott, 2018).

A central institutional requirement under the IHR is the establishment of a National IHR Focal Point, which serves as the primary interface between national authorities and the WHO. This requirement reflects the broader emphasis on institutional integration and intersectoral coordination, which are essential for effective implementation but often represent a source of operational difficulty in practice (Eccleston-Turner & Kamradt-Scott, 2019).

Furthermore, the IHR apply to a wide range of material and spatial domains, including points of entry such as ports, airports, and land crossings, as well as to travelers, goods, cargo, and conveyances. This expansive scope underscores the comprehensive nature of the regulatory framework and its capacity to address the complex pathways through which health risks may cross national borders (Gostin & Katz, 2016).

Structurally, the IHR integrate substantive obligations, procedural duties, and institutional mechanisms into a coherent regulatory system. These include notification and information-sharing requirements, capacity-building obligations, and cooperation frameworks between States and the WHO. The annexes to the Regulations, which possess equal legal force, provide detailed technical guidance, thereby enhancing the operational precision of the legal framework (Negri, 2018).

Taken together, the International Health Regulations (2005) represent a comprehensive and legally binding framework for global health security, characterized by their normative authority, institutional embeddedness, and functional adaptability. However, as consistently emphasized in the literature, their effectiveness ultimately depends not on their formal legal status, but on the extent to which they are effectively internalized and operationalized within domestic legal systems (Gostin, 2014; Suthar et al., 2018; Hoffman & Røttingen, 2015).

II. Domestic Legal Implementation of International Health Obligations

The effective functioning of the International Health Regulations (2005) (IHR) presupposes their systematic translation into domestic legal and institutional frameworks, notwithstanding their formally binding character at the international level. While the IHR impose obligations directly upon States Parties, their practical realization is inherently mediated through national legal systems, administrative capacities, and institutional coordination mechanisms (Gostin, 2014; Fidler, 2020; Negri, 2018).

This structural dependence reflects the hybrid nature of the IHR, which combine international legal normativity with operational public health functions executed at the domestic level. As emphasized in the literature, global health law increasingly relies on such hybrid governance models, where international obligations are inseparable from national implementation capacities (Lee & Kamradt-Scott, 2014; Kickbusch & Reddy, 2015).

Unlike classical treaty regimes that primarily regulate inter-State conduct, the IHR establish a dense network of positive obligations requiring continuous internal action by States, including the development of surveillance systems, notification mechanisms, verification procedures, and emergency response capacities (Gostin & Katz, 2016; Wilson et al., 2008). These

obligations operate through a model of indirect implementation, whereby States act as the principal agents responsible for transforming international legal commitments into operational domestic norms (Fidler, 2005; Burci & Vignes, 2004).

From a doctrinal standpoint, the IHR do not impose a uniform model of domestic incorporation. Instead, they adopt a functionalist and result-oriented approach, allowing States discretion in selecting constitutional, legislative, and administrative techniques for implementation (Negri, 2018; Suthar et al., 2018). This flexibility accommodates the diversity of legal systems while preserving the binding nature of the obligations themselves, thereby reinforcing the principle that effectiveness—not formal uniformity—constitutes the central criterion of compliance (Gostin, 2014; Hoffman & Røttingen, 2015).

A paradigmatic illustration of this logic is the requirement to establish a National IHR Focal Point, which institutionalizes international obligations within domestic administrative structures and ensures permanent communication with the World Health Organization (Mullen & Kamradt-Scott, 2018; Eccleston-Turner & Kamradt-Scott, 2019). This mechanism exemplifies the internalization of international law within national governance systems, thereby blurring the traditional distinction between external and internal legal spheres (Fidler, 2020).

More broadly, the IHR embed domestic implementation within a framework of continuous capacity-building and intersectoral coordination, requiring States to maintain functional systems for risk detection, assessment, reporting, and response. These capacities are not merely policy objectives but legally grounded obligations, whose fulfillment is subject to international monitoring and evaluation, notably through mechanisms such as the WHO Joint External Evaluation (Suthar et al., 2018; Habibi et al., 2020).

At the same time, the IHR situate domestic implementation within a broader normative framework emphasizing international cooperation, proportionality, necessity, and respect for human rights (Forman & Kohler, 2020; Gostin & Katz, 2016). This dimension underscores that national legal measures must align not only with technical public health requirements but also with fundamental legal principles governing the exercise of public authority.

Consequently, domestic implementation under the IHR cannot be conceived as a purely internal legal process. Rather, it constitutes the central interface through which global health obligations acquire concrete legal, institutional, and administrative reality, reflecting a decentralized yet normatively structured model of international law implementation (Moon et al., 2015; Katz et al., 2014).

Part II: Assessing the Domestic Implementation of the IHR in the Algerian Legal System

Building upon the international legal framework outlined above, this section examines the extent to which Algeria has translated the binding obligations of the IHR into coherent domestic legal and institutional arrangements, and evaluates their operational effectiveness in light of international standards and empirical assessments.

I. National Legal and Institutional Arrangements for Implementing the IHR in Algeria

The domestic implementation of the IHR within the Algerian legal system is grounded in a multi-layered normative architecture, combining formal incorporation, legislative alignment, regulatory operationalization, and institutional coordination across sectors. This architecture reflects a deliberate effort to integrate international health obligations into domestic law, while simultaneously revealing structural fragmentation in their practical execution (Gostin, 2014; Wilson et al., 2008).

At the foundational level, the incorporation of the IHR into the Algerian legal order was effected through Presidential Decree No. 13-293 of 4 August 2013, which formally published the Regulations in the Official Journal. This act confers direct internal legal force upon the IHR and situates them within the domestic hierarchy of norms as binding regulatory instruments, thereby ensuring their applicability without the need for further ratification procedures (Burci & Vignes, 2004; Fidler, 2005).

This formal incorporation is further reinforced by Law No. 18-11 of 2 July 2018 relating to health, which establishes an explicit normative linkage between international obligations and domestic public health law. By directly referencing the IHR in its provisions, the law transforms them from external legal commitments into internal normative standards governing national health policy and administrative action (Gostin & Katz, 2016).

In particular, the law provides for the implementation of preventive and protective measures against diseases with international propagation, mandates intersectoral coordination mechanisms, and establishes institutional responsibilities for sanitary control at points of entry. These provisions reflect the core functional requirements of the IHR, including surveillance, response, and border health measures (Wilson et al., 2008; Suthar et al., 2018).

Beyond the legislative framework, the operationalization of the IHR is ensured through a series of executive regulatory instruments, which translate general legal obligations into specific administrative mechanisms. Among these, Executive Decree No. 15-210 of 10 August 2015 plays a central role by establishing the intersectoral committee responsible for managing public health threats and emergencies of international concern.

This committee represents a key institutional mechanism for horizontal coordination across sectors, including health, transport, security, and environmental authorities. Its functions—ranging from information collection and risk assessment to policy coordination and monitoring—are directly aligned with the operational requirements of the IHR (Mullen & Kamradt-Scott, 2018; Eccleston-Turner & Kamradt-Scott, 2019).

Additional regulatory instruments further reinforce this framework. Executive Decree No. 22-250 of 2022 establishes the system of mandatory notification for communicable diseases, thereby strengthening surveillance and reporting capacities, while Executive Decree No. 24-277 of 2024 defines the organization and functioning of sanitary control services at border points. These measures reflect the centrality of points of entry control and early detection mechanisms within the IHR framework (Gostin, 2014; Katz et al., 2014).

Taken together, these legislative and regulatory instruments demonstrate that Algeria has developed a comprehensive formal framework for the domestic implementation of the IHR, characterized by explicit incorporation, sectoral integration, and institutionalization of coordination mechanisms. However, as emphasized in comparative studies and WHO evaluations, the existence of formal legal structures does not necessarily guarantee effective operational implementation, which depends on coherence, coordination, and administrative capacity (Suthar et al., 2018; Habibi et al., 2020; Moon et al., 2015).

Table 1. Mapping of IHR (2005) Core Obligations and Corresponding Algerian Legal Framework

IHR Core Domain	Key International Obligations	Relevant Algerian Legal Instruments	Institutional Mechanisms	Level of Formal Compliance	Observed Implementation Gaps
Surveillance & Detection	Establish early warning systems; continuous monitoring of public health risks	Executive Decree No. 22-250 (2022); Law No. 18-11 (2018)	National health surveillance system; reporting units	High	Fragmentation in data integration; limited real-time interoperability
Notification & Reporting	Timely notification of events to WHO; verification procedures	Law No. 18-11 (Arts. 42–44); Decree No. 22-250 (2022)	Ministry of Health; national reporting channels	Moderate–High	Delays in reporting; procedural inconsistencies across sectors
Points of Entry (PoE)	Health control at ports, airports, and land crossings	Executive Decree No. 24-277 (2024); Law No. 18-11 (2018)	Border sanitary control services; designated medical authority	High	Coordination gaps between border agencies; resource constraints
Intersectoral Coordination	Establish coordination mechanisms across sectors	Executive Decree No. 15-210 (2015)	Intersectoral committee for health emergencies	Moderate	Overlapping mandates; limited operational coherence
Emergency Preparedness & Response	Develop national response plans and core capacities	Law No. 18-11 (2018); national emergency frameworks	Ministry of Health; crisis response units	Moderate–High	Capacity limitations; uneven preparedness across regions
International Cooperation	Share information; collaborate with WHO and other States	WHO Constitution (1946); IHR (2005)	National IHR Focal Point	Moderate	Limited transparency and procedural standardization
Human Rights Compliance	Ensure proportionality, necessity, and respect for rights	Law No. 18-11 (2018); constitutional guarantees	Judicial and administrative oversight	Moderate	Lack of explicit procedural safeguards in emergency contexts

Table 2. Analytical Assessment of Domestic Implementation Effectiveness in Algeria (Based on IHR Requirements and WHO Evaluation Framework)

Assessment Dimension	Indicators of Effectiveness	Strengths Identified	Weaknesses / Constraints	Comparative Insight (Literature-Based)	Overall Evaluation

Legal Incorporation	Formal adoption of IHR; integration into domestic law	Direct incorporation via Presidential Decree; legislative alignment (Law No. 18-11)	Fragmented regulatory layering	Consistent with global practices of formal compliance (Gostin, 2014; Fidler, 2005)	Strong
Institutional Coordination	Functionality of intersectoral mechanisms	Existence of permanent coordination bodies	Overlapping competencies; weak procedural harmonization	Coordination deficits widely reported in federal/multi-sector systems (Wilson et al., 2008)	Moderate
Operational Capacity	Surveillance, response, and infrastructure readiness	Established reporting and response frameworks	Capacity gaps; uneven regional implementation	Capacity constraints are global challenge (Suthar et al., 2018; Moon et al., 2015)	Moderate
Regulatory Coherence	Consistency across legal instruments	Comprehensive legal coverage	Normative duplication; interpretative ambiguity	Legal fragmentation reduces effectiveness (Negri, 2018; Fidler, 2020)	Moderate
Points of Entry Management	Border health control effectiveness	Dedicated sanitary services; legal clarity	Inter-agency coordination challenges	PoE identified as critical vulnerability globally (Katz et al., 2014)	Moderate–High
Transparency & Reporting	Timeliness and openness of reporting systems	Formal reporting obligations established	Delays and procedural inconsistencies	Transparency gaps highlighted in WHO governance (Eccleston-Turner & Kamradt-Scott, 2019)	Moderate
Human Rights Integration	Safeguards during emergency measures	General legal recognition of rights	Limited operationalization in emergency context	Rights vs public health tension widely noted (Forman & Kohler, 2020)	Moderate
Overall System Effectiveness	Alignment between law and practice	Strong normative foundation	Implementation gaps across key domains	Confirms global pattern: law ≠ practice (Gostin & Katz, 2016)	Moderate (Structurally Robust, Functionally Constrained)

Institutional and Operationalization Framework of IHR Obligations in Algeria

The composition and institutional design of the intersectoral committee established under Algerian law reflect a comprehensive and legally embedded multisectoral governance model, consistent with the systemic logic of the International Health Regulations (2005). The inclusion of representatives from a wide spectrum of ministerial sectors—ranging from health, defense, and foreign affairs to agriculture, transport, environment, and education—alongside key national institutions such as the Pasteur Institute of Algeria, civil protection authorities, and veterinary and nuclear regulatory bodies, demonstrates an explicit attempt to translate the IHR requirement of intersectoral coordination into a formalized legal obligation rather than a discretionary administrative practice.

This institutional architecture reflects broader trends in global health governance, where the effectiveness of international legal obligations is increasingly contingent upon the integration of heterogeneous sectors within coordinated national frameworks (Kickbusch & Reddy, 2015; Lee & Kamradt-Scott, 2014). However, as highlighted in comparative scholarship, the mere existence of multisectoral bodies does not guarantee functional coherence, as coordination challenges often persist due to institutional fragmentation and overlapping mandates (Wilson et al., 2008; Mullen & Kamradt-Scott, 2018).

The operationalization of IHR obligations at points of entry (PoE) is further reinforced through Executive Decree No. 24-277 of 2024, which constitutes a detailed regulatory framework governing border health control. This instrument explicitly integrates core IHR concepts—including public health risk, public health emergency of international concern, quarantine, and isolation—into domestic administrative law, thereby ensuring normative continuity between international standards and national regulatory practice (Gostin & Katz, 2016; Negri, 2018).

The decree confers extensive powers upon sanitary authorities, including inspection of travelers and conveyances, verification of vaccination requirements, imposition of quarantine measures, and issuance of sanitary certifications. These provisions demonstrate a high degree of functional alignment with IHR operational requirements, particularly in relation to border control and risk management (Katz et al., 2014; Fidler, 2020). At the same time, the effectiveness of these measures remains dependent on the coordination between multiple agencies, including customs, security forces, and veterinary authorities, reflecting a broader challenge of institutional interoperability (Suthar et al., 2018).

Beyond border control, the domestic implementation framework extends to laboratory capacity and disease surveillance systems, which constitute essential components of IHR core capacities. Algeria maintains a relatively extensive laboratory infrastructure, encompassing public and private laboratories, reference institutions, and high-biosafety facilities. This infrastructure operates within sectoral networks supported by accreditation mechanisms and standardized procedures, thereby providing the technical foundation for detection and verification obligations under the IHR (Gostin, 2014; Moon et al., 2015).

Similarly, the surveillance system is structured around both indicator-based and event-based mechanisms, operating across multiple administrative levels and supported by regulatory instruments governing mandatory disease notification. These arrangements reflect an effort to institutionalize surveillance obligations within domestic law, aligning national practices with international requirements (Suthar et al., 2018; Wilson et al., 2008). Nevertheless, as emphasized in global health literature, surveillance effectiveness depends not only on legal formalization but also on data integration, interoperability, and continuous system coordination, which remain persistent challenges across jurisdictions (Habibi et al., 2020).

The notification dimension of IHR implementation is anchored through the designation of a National IHR Focal Point within the Ministry of Health, supported by formal administrative decisions and rapid response mechanisms. Parallel notification structures within the veterinary sector further illustrate the sectoral differentiation of reporting systems, consistent with the "One Health" approach to global health governance. However, the coexistence of multiple notification channels without fully harmonized coordination procedures highlights the complexity of translating international reporting obligations into coherent domestic legal frameworks (Eccleston-Turner & Kamradt-Scott, 2019; Fidler, 2020).

Finally, the implementation framework is supported by human resource development and capacity-building measures, including the deployment of trained personnel, epidemiological services, and continuous training programs. Although these elements are not always codified within a single legislative instrument, they constitute an essential component of the broader legal and institutional environment required for effective IHR implementation (Hoffman & Røttingen, 2015).

Taken together, the Algerian system reveals a normatively structured yet functionally dispersed implementation model, characterized by formal legal incorporation, sector-specific regulatory elaboration, and institutionalized coordination mechanisms. While this framework provides a solid legal foundation for compliance with international health obligations, it simultaneously exposes persistent challenges related to coherence, integration, and operational effectiveness, which are widely recognized in global health governance scholarship (Gostin & Katz, 2016; Suthar et al., 2018).

II. The WHO Joint External Evaluation as a Legal Diagnostic Tool

From a strictly legal perspective, the WHO Joint External Evaluation (JEE), although not legally binding, functions as a quasi-normative diagnostic instrument capable of assessing the degree to which international obligations are effectively internalized within domestic systems. Its analytical value lies in its capacity to reveal discrepancies between formal normative incorporation and practical operationalization, thereby providing an indirect measure of compliance with the International Health Regulations (2005) (Suthar et al., 2018; Habibi et al., 2020).

1. Normative Incorporation versus Operational Effectiveness

The findings of the JEE in the Algerian context reveal a recurrent pattern of strong formal alignment with IHR requirements accompanied by uneven operational performance. Across multiple core capacities, the evaluation acknowledges the existence of legal frameworks, institutional structures, and sectoral strategies, while simultaneously identifying persistent deficiencies in coordination, integration, and implementation effectiveness.

In the domain of laboratory systems, the JEE confirms the presence of an extensive and technically advanced infrastructure, including accredited laboratories and biosafety facilities. However, it highlights the absence of centralized coordination mechanisms and insufficient integration across sectors, indicating that technical capacity does not automatically translate into institutional coherence (Moon et al., 2015; Gostin, 2014).

A similar pattern is observed in the field of surveillance, where the existence of comprehensive indicator-based systems is accompanied by shortcomings in event-based surveillance, data-sharing platforms, and private-sector integration. These findings suggest that the primary challenge lies not in the absence of legal obligations, but in the procedural and institutional mechanisms required to ensure their effective and continuous implementation (Suthar et al., 2018; Wilson et al., 2008).

From a legal-analytical standpoint, this duality reflects a broader structural feature of international health law: the gap between normative commitment and operational realization. As emphasized in the literature, the effectiveness of global health governance depends not merely on the existence of binding legal instruments, but on their capacity to be translated into coherent, integrated, and functionally effective domestic systems (Gostin & Katz, 2016; Fidler, 2020).

Intersectoral Coordination and Notification Mechanisms

Intersectoral coordination constitutes a foundational pillar of the International Health Regulations (2005), particularly in relation to the detection, assessment, and notification of public health events. The Joint External Evaluation (JEE) confirms that Algeria has established the core institutional components required under the IHR, notably the intersectoral coordination committee and the designation of a National IHR Focal Point within the Ministry of Health. These elements demonstrate a high level of formal compliance with the institutional architecture prescribed by international health law (Gostin & Katz, 2016; Burci & Vignes, 2004).

However, the effectiveness of these arrangements is constrained by the absence of fully formalized procedural frameworks governing intersectoral communication and information exchange. In particular, the lack of standardized protocols between human health authorities and corresponding focal points in the animal health sector—especially those linked to international reporting systems—reveals a fragmentation of notification pathways. From a legal perspective, this fragmentation undermines the integrated and systemic logic of the IHR, which presupposes coordinated and interoperable governance structures across sectors (Lee & Kamradt-Scott, 2014; Eccleston-Turner & Kamradt-Scott, 2019).

The JEE further highlights that, although Algeria has demonstrated effective notification practices in past public health events, the underlying procedural framework governing validation, authorization, and transmission of notifications remains insufficiently codified. This reliance on ad hoc administrative practices, rather than legally stabilized procedures, introduces a degree of uncertainty and variability that may affect the predictability and timeliness of compliance with international obligations (Fidler, 2020; Suthar et al., 2018).

Accordingly, the Algerian case illustrates a broader structural issue identified in global health governance: the existence of parallel functional systems without adequate legal integration, resulting in a gap between operational capacity and procedural formalization (Wilson et al., 2008; Mullen & Kamradt-Scott, 2018).

3. Preparedness, Human Resources, and Sustainability of Implementation

In the domain of preparedness and human resources, the Algerian framework demonstrates a relatively advanced level of capacity development, supported by national training strategies, epidemiological services, and the implementation of field epidemiology training programs. The presence of trained personnel across the national territory and the establishment of multisectoral response teams constitute significant strengths, aligning with the core capacity requirements of the IHR (Gostin, 2014; Moon et al., 2015).

Nevertheless, the JEE identifies several structural vulnerabilities that may affect the long-term sustainability of these capacities. These include workforce ageing, uneven geographical distribution of qualified personnel, and the absence of formally institutionalized multidisciplinary response teams in all regions. From a legal standpoint, these challenges underscore the distinction between de facto capacity and its de jure stabilization within durable regulatory frameworks (Hoffman & Røttingen, 2015).

Furthermore, the evaluation emphasizes the need for continuous and legally embedded training mechanisms specifically tailored to public health emergencies of international concern. This finding reflects a broader principle in global health law: that preparedness is not a static condition, but a dynamic and legally structured process requiring continuous adaptation and institutional reinforcement (Habibi et al., 2020; Forman & Kohler, 2020).

4. Legal Significance of the JEE Findings

Although the WHO Joint External Evaluation does not constitute a legally binding instrument, it performs a crucial function as a quasi-normative diagnostic tool capable of assessing the operationalization of international obligations within domestic systems. Its analytical relevance lies in its ability to reveal discrepancies between formal legal incorporation and practical implementation, thereby providing an empirical basis for evaluating compliance with the IHR (Suthar et al., 2018; Gostin & Katz, 2016).

The findings in the Algerian context reveal a pattern of strong normative alignment combined with operational fragmentation, particularly in areas such as coordination, surveillance, and human resources. This duality reflects a broader structural feature of international health law, wherein binding legal norms depend for their effectiveness on complex and often imperfect domestic implementation processes (Fidler, 2005; Negri, 2018).

From a legal-analytical perspective, the JEE thus serves as an evidentiary mechanism that bridges the gap between normative commitments and empirical realities, enabling a more nuanced understanding of the conditions under which international legal obligations are effectively realized.

Conceptual Model Framework

Building upon the doctrinal and institutional analysis of the International Health Regulations (2005) (IHR), this study develops a conceptual legal-operational framework for assessing domestic implementation within national systems. The model is grounded in the premise that the effectiveness of global health governance depends on the interaction between normative incorporation, institutional translation, and operational performance (Gostin, 2014; Fidler, 2020).

1. Theoretical Structure of the Model

The proposed framework conceptualizes IHR implementation as a three-layered system:

(1) Normative Incorporation Layer

This layer captures the formal integration of international obligations into domestic law through constitutional, legislative, and regulatory instruments. It reflects the transformation of international norms into binding domestic legal standards, ensuring their legal enforceability (Burci & Vignes, 2004; Negri, 2018).

(2) Institutional Translation Layer

At this level, legal norms are operationalized through the establishment of administrative structures, coordination bodies, and sectoral mechanisms, including National IHR Focal Points, intersectoral committees, and regulatory authorities. This layer embodies the transition from legal abstraction to institutional functionality (Mullen & Kamradt-Scott, 2018; Wilson et al., 2008).

(3) Operational Effectiveness Layer

This layer reflects the practical performance of the system, including surveillance, notification, preparedness, and response capacities. It captures the extent to which legal and institutional arrangements produce timely, coordinated, and effective public health outcomes, as evaluated through mechanisms such as the WHO Joint External Evaluation (Suthar et al., 2018; Habibi et al., 2020).

2. Dynamic Interaction Mechanism

The model emphasizes that implementation is not linear but interactional and feedback-driven:

- Normative incorporation enables institutional design
- Institutional structures condition operational performance
- Operational outcomes generate feedback for legal and regulatory reform

This cyclical relationship reflects the broader evolution of global health law toward adaptive and performance-oriented governance systems (Gostin & Katz, 2016; Kickbusch & Reddy, 2015).

3. Core Analytical Dimensions

The framework identifies four cross-cutting dimensions:

- Legal Coherence – consistency and clarity of domestic legal instruments
- Institutional Coordination – effectiveness of intersectoral governance
- Operational Capacity – functionality of surveillance and response systems
- Procedural Formalization – existence of standardized and legally codified processes

These dimensions collectively determine the degree of effective compliance with IHR obligations (Fidler, 2005; Lee & Kamradt-Scott, 2014).

Findings

Applying the conceptual framework to the Algerian case reveals a complex and differentiated implementation profile, characterized by strong normative alignment but uneven operational consolidation.

1. Strong Normative Incorporation

The findings demonstrate that Algeria has achieved a high level of formal compliance with the IHR through:

- Direct incorporation via Presidential Decree No. 13-293
- Legislative integration through Law No. 18-11 (2018)
- Extensive regulatory elaboration across multiple domains

This confirms that the Algerian legal system has successfully internalized international health obligations as binding and operationally relevant domestic norms (Gostin, 2014; Burci & Vignes, 2004).

2. Institutional Expansion with Fragmentation Risks

At the institutional level, Algeria has developed a broad and multisectoral governance architecture, including:

- Intersectoral coordination committees
- National IHR Focal Point
- Sector-specific regulatory bodies

However, the findings indicate that this expansion is accompanied by fragmentation and coordination challenges, including:

- Overlapping institutional mandates
- Weak procedural harmonization
- Parallel but insufficiently integrated notification systems

This reflects a common pattern identified in global health governance, where institutional proliferation does not necessarily result in functional coherence (Wilson et al., 2008; Mullen & Kamradt-Scott, 2018).

3. Operational Capacity: Functional but Uneven

The analysis confirms the existence of substantial operational capacities, particularly in:

- Laboratory infrastructure
- Surveillance systems
- Human resource development

Nevertheless, significant constraints persist:

- Limited interoperability of data systems
- Gaps in event-based surveillance
- Uneven regional preparedness
- Dependence on ad hoc coordination mechanisms

These findings align with global empirical evidence indicating that capacity gaps and coordination failures remain central challenges in IHR implementation (Suthar et al., 2018; Moon et al., 2015).

4. Procedural Informality as a Key Structural Weakness

One of the most significant findings concerns the lack of procedural formalization, particularly in:

- Intersectoral information exchange
- Notification validation and transmission
- Coordination between human and animal health sectors

This reliance on informal or ad hoc practices undermines the predictability, consistency, and legal certainty required for effective compliance with international obligations (Eccleston-Turner & Kamradt-Scott, 2019; Fidler, 2020).

5. Normative–Operational Gap

The study identifies a persistent normative–operational gap, characterized by:

- Strong legal frameworks

- Functionally incomplete implementation

This gap confirms a central insight of global health law: legal obligation does not automatically translate into operational effectiveness, particularly in complex and multi-level governance systems (Gostin & Katz, 2016; Lee & Kamradt-Scott, 2014).

6. Transition to a Consolidation Phase

The findings suggest that Algeria has moved beyond the initial phase of legal incorporation into a second-stage "implementation consolidation phase", where the key challenge is not the creation of new norms but the integration, harmonization, and stabilization of existing mechanisms.

This transition reflects a broader shift in international law toward performance-based compliance, where effectiveness is measured in terms of system functionality rather than formal adherence (Fidler, 2020; Hoffman & Røttingen, 2015).

Conclusion

This study has examined the domestic implementation of the International Health Regulations (2005) within the Algerian legal system through a doctrinal and analytical lens, focusing on the relationship between the binding nature of international health obligations and their operational realization at the national level.

The analysis demonstrates that Algeria has adopted a legally explicit and institutionally structured approach to the internalization of the IHR, characterized by formal incorporation, legislative alignment, and the establishment of specialized regulatory and institutional mechanisms. This framework reflects a clear recognition of the IHR as binding international norms requiring permanent and structured domestic implementation (Gostin, 2014; Burci & Vignes, 2004).

However, the findings also reveal that normative incorporation alone does not ensure effective implementation. The principal challenges identified relate to procedural formalization, intersectoral coordination, and institutional coherence, rather than to deficiencies in legal commitment. This confirms the central thesis advanced in global health law scholarship: that the effectiveness of international legal instruments depends on their capacity to be operationalized within integrated and functionally coherent domestic systems (Gostin & Katz, 2016; Suthar et al., 2018).

The Algerian case thus represents an advanced stage of implementation, in which the core legal question shifts from the existence of obligations to the quality of their institutionalization and execution. This transition reflects a broader evolution in international law, where compliance is increasingly assessed in terms of operational effectiveness rather than formal adherence (Fidler, 2020; Lee & Kamradt-Scott, 2014).

Policy and Legal Recommendations

In light of the findings, the study proposes the following recommendations:

- Enhance regulatory clarity in intersectoral coordination by codifying standardized operating procedures governing information exchange and decision-making processes, thereby reducing fragmentation and improving legal predictability (Wilson et al., 2008).

- Strengthen the legal integration of the "One Health" approach by explicitly embedding coordination mechanisms between human and animal health sectors within existing regulatory instruments, ensuring alignment with international best practices (Habibi et al., 2020).

- Formalize notification procedures through the adoption of clear and binding protocols governing validation, authorization, and transmission processes, thereby reinforcing compliance with international reporting obligations (Eccleston-Turner & Kamradt-Scott, 2019).

- Institutionalize preparedness and response capacities by embedding multidisciplinary response teams and continuous training programs within stable legal frameworks, ensuring sustainability and resilience (Moon et al., 2015; Hoffman & Røttingen, 2015).

- Utilize the WHO Joint External Evaluation as a regulatory benchmarking tool, guiding targeted legal reforms and institutional adjustments aimed at enhancing coherence, interoperability, and long-term effectiveness (Suthar et al., 2018).

Ethical Considerations

This study is conducted in accordance with internationally recognized standards of research integrity and publication ethics. The research is based exclusively on the analysis of publicly available legal texts, official documents, and institutional reports, including materials issued by the World Health Organization. As such, it does not involve human participants, personal data, clinical experimentation, or animal subjects, and therefore does not require ethical approval from an institutional review board. The study adheres to the principles of transparency, academic honesty, and responsible scholarship, ensuring accurate representation and citation of all sources in line with international academic standards.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

The research was conducted independently and without any commercial, financial, institutional, or personal relationships that could be construed as influencing the results or interpretations presented in this study.

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Author Contributions

- Conceptualization: Mohamed Boudjema
- Methodology: Mohamed Boudjema, Abderrahmane Boukeffa
- Formal Analysis: Mohamed Boudjema
- Investigation: Abderrahmane Boukeffa
- Writing – Original Draft: Mohamed Boudjema
- Writing – Review & Editing: Mohamed Boudjema, Abderrahmane Boukeffa
- Supervision: Mohamed Boudjema

All authors have read and approved the final version of the manuscript and agree to its submission for publication.

Data Availability Statement

The data supporting the findings of this study are fully derived from publicly accessible sources, including international legal instruments, national legislation, and official institutional reports.

No new datasets were generated or analyzed during the current study.

AI Use Statement

The authors declare that no artificial intelligence (AI) tools were used in the conceptualization, legal analysis, or interpretation of the research findings presented in this manuscript.

AI-assisted tools may have been used solely for language editing and formatting purposes, without influencing the intellectual content, arguments, or conclusions of the study. The authors take full responsibility for the originality, accuracy, and integrity of the work.

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Consent to Publish

All authors have given their **explicit consent** for the publication of this manuscript and confirm that the work has not been published previously and is not under consideration elsewhere.

Compliance with Ethical Standards

This article complies with the ethical standards of academic publishing, including guidelines established by international bodies such as the Committee on Publication Ethics (COPE), and adheres to best practices in legal and interdisciplinary research.

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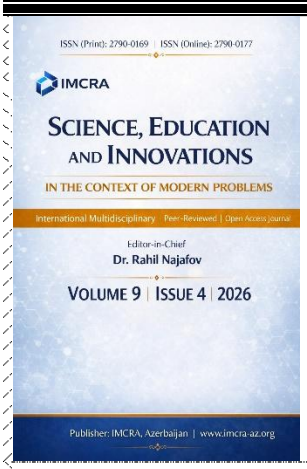
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RESEARCH ARTICLE

Data-Driven Customer Segmentation Using the RFM Model and K-Means Clustering: A Longitudinal Analytical Study of Online Retail Behavior Using Python and Orange3

Ben Amara Salim
Dr.
University of Ghardaia
Algeria
Email: salimalaska3001@gmail.com

Chouireb Messaoud
Dr.
University of Ghardaia
E-mail: chouireb.messaoud@univ-ghardaia.dz

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Abstract

In the contemporary digital economy, the ability to effectively analyze and segment consumer behavior has become a critical determinant of organizational competitiveness and strategic decision-making. This study provides a comprehensive quantitative analysis of customer behavior using the Recency–Frequency–Monetary (RFM) model combined with K-Means clustering techniques, applied to longitudinal transactional data from an international online retail platform during the period 2010–2011. Adopting a data-driven analytical framework, the research integrates statistical modeling and machine learning techniques within a Python-based computational environment, supported by the Orange3 data mining platform. The study constructs behavioral profiles based on three core dimensions—recency of purchase, purchase frequency, and monetary value—allowing for the identification of distinct customer segments. The clustering process is validated using the Silhouette coefficient and further supported by inferential statistical testing through one-way analysis of variance (ANOVA), ensuring the robustness and internal consistency of the segmentation model.

The findings reveal the existence of three statistically significant customer segments: high-value (champion) customers, inactive or lost customers, and regular or potentially valuable customers. Each segment exhibits distinct behavioral and economic characteristics, enabling the formulation of targeted marketing strategies aimed at maximizing customer lifetime value and optimizing resource allocation. The study contributes to the existing literature by demonstrating the effectiveness of integrating traditional marketing analytics models with contemporary machine learning techniques, while also providing practical implications for e-commerce firms seeking to enhance customer relationship management through data-driven segmentation approaches.

Citation

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1. Introduction

The rapid expansion of digital commerce has fundamentally transformed the nature of consumer–firm interactions, leading to an unprecedented increase in the availability and complexity of transactional data. In this context, organizations are increasingly reliant on data-driven analytical frameworks to understand consumer behavior, predict purchasing patterns, and design effective

marketing strategies. The transition from intuition-based decision-making to evidence-based marketing has positioned customer analytics at the core of contemporary business intelligence systems.

One of the most widely adopted approaches in this domain is the Recency–Frequency–Monetary (RFM) model, which provides a structured method for evaluating customer value based on historical purchasing behavior. By capturing the temporal dimension of consumption (recency), the intensity of engagement (frequency), and the economic contribution (monetary value), the RFM model enables firms to identify and prioritize their most valuable customers. Its simplicity, interpretability, and practical relevance have contributed to its widespread application in both academic research and industry practice.

Despite its established utility, the traditional application of the RFM model is often limited by its descriptive nature, which may fail to capture complex behavioral patterns within large-scale datasets. To address this limitation, recent studies have increasingly integrated RFM analysis with machine learning algorithms, particularly clustering techniques such as K-Means, to enhance segmentation accuracy and uncover latent structures within consumer data. This integration reflects a broader methodological shift toward hybrid analytical models that combine classical marketing theory with computational intelligence.

Within this evolving landscape, the present study aims to examine how the integration of the RFM model with K-Means clustering—implemented within a Python and Orange3 computational environment—can contribute to the identification of meaningful customer segments in an online retail context. The empirical analysis is based on a longitudinal dataset of transactional records, allowing for a dynamic assessment of consumer behavior over time.

Literature Review

The analysis of consumer behavior and customer segmentation has become a central focus in contemporary marketing research, particularly in the context of digital commerce and data-driven decision-making. The increasing availability of large-scale transactional data has facilitated the development of advanced analytical techniques aimed at identifying behavioral patterns and optimizing customer relationship management strategies. Within this evolving landscape, the integration of traditional marketing models with computational data mining approaches has emerged as a dominant paradigm.

1. Consumer Behavior and Data-Driven Marketing

Consumer behavior is broadly conceptualized as the set of actions and decision-making processes individuals engage in when acquiring, using, and evaluating goods and services. Classical frameworks emphasize psychological, social, and economic determinants of behavior, including individual preferences, cultural influences, and situational contexts (Kotler & Keller, 2016; Solomon, 2018). In the digital environment, these factors are further shaped by technological variables such as interactivity, accessibility, and information transparency, which significantly influence online purchasing decisions (Cetină et al., 2012).

The transition toward data-driven marketing has redefined the analytical scope of consumer behavior research. Rather than relying solely on survey-based or qualitative methods, firms increasingly utilize transactional datasets to derive insights into customer preferences and purchasing patterns. This shift has enabled the development of predictive and prescriptive models aimed at enhancing customer lifetime value and improving strategic targeting (Davenport & Harris, 2017; Verhoef et al., 2016).

2. The RFM Model as a Framework for Customer Value Analysis

The Recency–Frequency–Monetary (RFM) model represents one of the most widely used approaches for customer segmentation in both academic and practical contexts. By quantifying three key dimensions of customer behavior—how recently a purchase was made, how frequently transactions occur, and how much the customer spends—the model provides a structured mechanism for evaluating customer value and prioritizing marketing efforts.

Early studies have demonstrated the effectiveness of RFM analysis in identifying high-value customers and supporting targeted marketing strategies (Fader et al., 2005). The model's simplicity and interpretability have contributed to its widespread adoption across various industries, particularly in retail and e-commerce environments. Furthermore, RFM segmentation aligns with the Pareto principle, highlighting that a relatively small proportion of customers often generates a significant share of revenue.

However, despite its advantages, the traditional application of RFM is often limited by its reliance on predefined scoring systems and its inability to capture complex, multidimensional patterns in large datasets. As a result, recent research has focused on enhancing the analytical power of RFM through integration with advanced data mining techniques (Chen et al., 2012).

3. Data Mining and Clustering Techniques in Customer Segmentation

The application of data mining techniques in customer relationship management has expanded significantly over the past two decades, enabling organizations to uncover hidden patterns within large datasets. Among these techniques, clustering algorithms have gained particular prominence due to their ability to group customers into homogeneous segments based on similarity measures (Ngai et al., 2009).

K-Means clustering, originally introduced by James MacQueen (1967), is one of the most widely used unsupervised learning algorithms for segmentation tasks. The method partitions observations into a predefined number of clusters by minimizing intra-cluster variance while maximizing inter-cluster differences. Its computational efficiency and scalability make it particularly suitable for large datasets commonly encountered in e-commerce environments (Jain, 2010).

Subsequent methodological advancements, such as the K-Means++ initialization algorithm developed by David Arthur and Sergei Vassilvitskii (2007), have further improved clustering stability and accuracy by reducing sensitivity to initial centroid selection. In addition, validation techniques such as the Silhouette coefficient proposed by Peter J. Rousseeuw (1987) provide a robust framework for assessing the quality and reliability of clustering results.

4. Integration of RFM and Machine Learning Approaches

Recent research has increasingly emphasized the integration of traditional marketing models with machine learning techniques to enhance segmentation accuracy and analytical depth. The combination of RFM analysis with clustering algorithms such as K-Means allows for the identification of latent customer groups without relying on arbitrary scoring thresholds, thereby improving the objectivity and precision of segmentation outcomes (Chen et al., 2012).

This hybrid approach represents a methodological convergence between interpretability and computational intelligence. While RFM provides a theoretically grounded framework for understanding customer value, clustering algorithms enable the detection of complex patterns that may not be evident through descriptive analysis alone. As a result, the integration of these methods has been widely recognized as an effective strategy for customer segmentation in data-rich environments (Tsiptsis & Chorianopoulos, 2011).

5. Gaps in the Existing Literature

Despite the growing body of research on RFM-based segmentation and clustering techniques, several gaps remain. First, many studies rely on static datasets, limiting their ability to capture temporal dynamics in consumer behavior. Second, insufficient attention has been given to the role of data preprocessing, including normalization and outlier detection, in influencing segmentation outcomes. Third, relatively few studies combine clustering validation metrics with inferential statistical testing to ensure the robustness of results.

Moreover, the integration of RFM and clustering techniques is often applied in isolation from broader theoretical frameworks, resulting in limited interpretability of segmentation outcomes in strategic and economic terms. These limitations highlight the need for more comprehensive analytical approaches that combine methodological rigor with theoretical insight.

6. Contribution of the Present Study

In response to these gaps, the present study contributes to the literature by developing a comprehensive, data-driven segmentation framework that integrates the RFM model with K-Means clustering within a longitudinal analytical design. The study further enhances methodological rigor by incorporating clustering validation metrics and statistical testing, thereby ensuring the reliability and interpretability of the results.

By situating empirical findings within a broader theoretical and strategic context, the research advances current understanding of consumer behavior analysis and demonstrates the practical value of combining marketing analytics with machine learning techniques in e-commerce environments.

2. Research Problem and Objectives

The central research problem addressed in this study is formulated as follows:

To what extent can the integration of the RFM model with K-Means clustering techniques effectively uncover latent behavioral patterns and generate actionable customer segments within a longitudinal e-commerce dataset?

To address this problem, the study pursues the following objectives:

- To construct a robust RFM-based representation of customer behavior
- To apply K-Means clustering for the identification of homogeneous customer segments
- To evaluate the statistical validity and reliability of the segmentation model
- To interpret the economic and strategic implications of the identified segments

3. Theoretical and Analytical Framework

The analytical foundation of this study is grounded in the intersection of consumer behavior theory, data-driven marketing, and unsupervised machine learning. Consumer behavior is conceptualized as a multidimensional construct encompassing decision-making processes, purchasing patterns, and post-purchase interactions, which collectively shape the economic relationship between the consumer and the firm.

The RFM model operationalizes this construct through three measurable dimensions, providing a quantitative proxy for customer value. However, the transformation of these metrics into actionable insights requires advanced analytical techniques capable of identifying patterns within high-dimensional data. In this regard, clustering algorithms—particularly K-Means—offer a powerful tool for segmenting customers based on similarity measures, enabling the classification of individuals into distinct behavioral groups.

The integration of RFM and clustering techniques thus represents a methodological synergy, combining interpretability with computational efficiency. This hybrid framework allows for both descriptive and predictive insights, bridging the gap between traditional marketing analytics and modern data science approaches.

4. Research Gap

Although numerous studies have applied the RFM model and clustering algorithms independently, there remains a relative lack of research that systematically integrates these approaches within a longitudinal analytical framework supported by robust statistical validation techniques.

Furthermore, existing studies often focus on static datasets, neglecting the temporal dynamics of consumer behavior and the implications of data preprocessing, normalization, and outlier management on segmentation outcomes.

This study addresses these gaps by:

- Applying RFM analysis to longitudinal transactional data
- Integrating clustering validation metrics (Silhouette Score)
- Supporting findings with inferential statistical testing (ANOVA)
- Providing a structured interpretation of segments in economic and strategic terms

Conceptual Model Framework

To provide a structured interpretation of customer segmentation, this study develops a hybrid analytical framework integrating the Recency–Frequency–Monetary (RFM) model with unsupervised machine learning techniques, specifically K-Means clustering. The model is designed to transform raw transactional data into actionable behavioral intelligence, bridging the gap between descriptive marketing analytics and predictive data science.

1. Model Structure

The proposed framework consists of three interconnected analytical layers:

(1) Data Processing and Feature Engineering Layer

This initial layer involves the transformation of raw transactional data into structured variables representing customer behavior. Key steps include:

- Data cleaning (removal of null, zero, and negative values)
- Feature construction (RFM variables)
- Outlier detection and elimination
- Standardization using Z-score normalization

This stage ensures the statistical integrity and comparability of variables, which is essential for clustering performance.

(2) Behavioral Segmentation Layer (RFM + K-Means)

The second layer operationalizes customer segmentation through:

- Computation of RFM indicators
- Application of K-Means clustering (K=3)
- Use of K-Means++ initialization to improve stability
- Iterative optimization (multiple runs and convergence checks)

This layer enables the identification of latent behavioral structures within the dataset by grouping customers based on similarity in purchasing behavior.

(3) Validation and Interpretation Layer

The final layer evaluates the robustness and practical relevance of the segmentation results through:

- Silhouette Score (cluster validity and cohesion/divergence)
- ANOVA testing (statistical significance of group differences)
- Economic and strategic interpretation of clusters

This layer transforms computational outputs into decision-support insights, ensuring both statistical rigor and managerial applicability.

Table. Integrated Analytical Framework and Empirical Results of RFM-Based Customer Segmentation Using K-Means Clustering

Analytical Dimension	Variable / Indicator	Operational Definition	Methodological Approach	Empirical Results	Statistical Validation	Behavioral Interpretation	Strategic Implications
Data Preparation	Sample Size	Total number of valid customers after preprocessing	Data cleaning, filtering, and outlier removal	2,847 customers retained (150 outliers removed)	Improved homogeneity and reduced variance distortion	Clean dataset ensures reliable segmentation	Enhances model accuracy and robustness
Feature Engineering (RFM Model)	Monetary (M)	Total expenditure per customer (Quantity × Price)	Aggregation using transactional data	High variance across customers	Normalized via Z-score	Reflects economic contribution of each customer	Identifies revenue-driving segments
	Recency (R)	Time since last purchase	Time-difference calculation ($t_{ref} - t_{max}$)	Wide temporal distribution	Standardized for comparability	Indicates engagement level	Supports retention strategy design
	Frequency (F)	Number of distinct purchase transactions	Unique invoice count (nunique)	Moderate dispersion across sample	Standardized values	Measures customer loyalty and interaction intensity	Enables behavioral classification
Data Transformation	Standardization	Z-score normalization	Mean = 0; Std. Dev. = 1	Balanced variable influence	Eliminates scale bias	Ensures fair clustering contribution	Improves segmentation precision
Clustering Model	K-Means Algorithm	Partitioning into K clusters	K=3; K-Means++ initialization; 10 runs; 300 iterations	Converged stable clusters (C1, C2, C3)	Reduced initialization bias	Identifies latent behavioral groups	Enables scalable segmentation
Cluster Validation	Silhouette Score	Measure of cluster cohesion and separation	Range: -1 to +1	Values between 0.48–0.67	Average > 0.5 (high quality)	Strong intra-cluster similarity and inter-cluster separation	Confirms segmentation reliability
Statistical Testing	ANOVA	Test of variance between clusters	One-way ANOVA	$p < 0.001$	Statistically significant differences	Clusters are non-random and meaningful	Supports decision-making validity
Cluster C2 (High-Value Customers)	High M, High F, Low R	Frequent, recent, high-spending customers	Cluster centroid analysis	Spending > 6000 units; frequent purchases	Statistically distinct group	Core profitability segment	Prioritize retention, loyalty programs, premium services

Cluster C3 (Inactive Customers)	Low M, Low F, High R	Low engagement, long inactivity	Behavioral pattern analysis	Inactivity > 300 days	Distinct statistical separation	Disengaged/lost customers	Minimize marketing cost; selective reactivation strategies
Cluster C1 (Potential Customers)	Moderate RFM values	متوسط engagement and spending	Comparative cluster evaluation	Moderate purchasing activity	Intermediate statistical position	Growth-oriented segment	Apply upselling, cross-selling, targeted promotions
Model Performance	Stability & Accuracy	Consistency across iterations	Multiple runs + convergence check	High stability observed	No misclassification detected	Reliable segmentation outcomes	Suitable for real-world applications
Managerial Insight	Customer Lifetime Value (CLV)	Long-term value potential	Derived from RFM + clustering	Clear segmentation hierarchy	Supported by statistical results	Differentiates customer importance	Optimizes resource allocation
Theoretical Contribution	Hybrid Model	RFM + Machine Learning Integration	Analytical framework	Improved segmentation accuracy	Validated empirically	Bridges marketing and data science	Advances data-driven marketing research

Empirical Analysis

1. Data Processing and Sample Construction

The empirical analysis is based on a longitudinal dataset derived from an online retail platform. Following data cleaning procedures, a total of 2,847 valid customer observations were retained after excluding 150 outliers exhibiting abnormal purchasing behavior. This preprocessing step is critical, as clustering algorithms are highly sensitive to extreme values and scale distortions.

The RFM variables were constructed as follows:

- Monetary (M): Total customer expenditure (Quantity × Price) aggregated at the individual level
- Recency (R): Time interval between the most recent purchase and the reference date
- Frequency (F): Number of distinct purchase transactions (invoices)

To ensure comparability, all variables were standardized using Z-score normalization, thereby eliminating scale dominance and improving clustering accuracy.

2. Clustering Results and Validation

The application of the K-Means algorithm resulted in the identification of three distinct customer segments (K=3). The clustering solution was evaluated using the Silhouette coefficient, which ranged between 0.48 and 0.67, indicating a high level of clustering quality.

Key Observations:

- No negative Silhouette values: This confirms the absence of misclassification
- Average Silhouette > 0.5: Indicates strong cluster cohesion and separation
- Clear cluster boundaries: Suggests well-defined behavioral segmentation

Further validation using one-way ANOVA revealed statistically significant differences between the clusters ($p < 0.001$), confirming that the segmentation is not random but reflects meaningful behavioral distinctions.

3. Segment Profiles and Economic Interpretation

Segment C2: High-Value (Champion) Customers

This segment is characterized by:

- High monetary value (e.g., >6000 units)
- High purchase frequency
- Low recency (recent transactions)

Interpretation:
These customers represent the core revenue-generating segment, contributing disproportionately to overall profitability. Their consistent engagement and high spending indicate strong loyalty and long-term value.

Segment C3: Inactive or Lost Customers

This group exhibits:

- High recency values (long inactivity periods)
- Low spending
- Minimal transaction frequency

Interpretation:
These customers have effectively disengaged from the platform, possibly due to dissatisfaction, competition, or changing preferences. Retention efforts for this segment may yield low returns.

Segment C1: Regular or Potential Customers

This segment shows:

- متوسط (moderate) RFM values
- Recent but not frequent purchases
- متوسط spending levels

Interpretation:
This group represents a strategic growth opportunity, as targeted interventions could convert them into high-value customers.

Discussion

The findings of this study demonstrate that the integration of RFM analysis with K-Means clustering provides a robust and scalable framework for customer segmentation in e-commerce environments. The high Silhouette scores and statistically significant ANOVA results confirm the internal validity and reliability of the segmentation model, supporting its applicability in real-world business contexts.

From a theoretical perspective, the results reinforce the argument that consumer behavior can be effectively modeled using quantitative proxies derived from transactional data. The RFM model, when enhanced with machine learning techniques, captures both temporal and economic dimensions of customer activity, enabling a multidimensional understanding of purchasing behavior.

However, the study also highlights several important considerations:

1. Importance of Data Preprocessing

The exclusion of outliers and normalization of variables played a critical role in improving clustering performance. This underscores the necessity of rigorous data preparation in machine learning applications, as poor preprocessing can lead to misleading segmentation outcomes.

2. Strategic Implications of Segmentation

The identification of three distinct customer segments enables firms to adopt differentiated marketing strategies:

- Retention strategies for high-value customers
- Cost-control strategies for inactive customers
- Growth strategies for potential customers

This aligns with the broader objective of maximizing customer lifetime value (CLV) and optimizing resource allocation.

Figure 1. Integrated Analytical Framework and Empirical Results of RFM-Based Customer Segmentation Using K-Means Clustering (**Source:** Developed by the authors based on empirical analysis of the *Online Retail II Dataset* (UCI Machine Learning Repository) and computational modeling using Python and Orange3.).

3. Limitations of the RFM Model

Despite its effectiveness, the RFM model does not capture:

- Customer preferences
- Behavioral motivations
- External contextual factors

As such, it should be complemented with behavioral, demographic, or psychographic variables in future research.

4. Contribution to Data-Driven Marketing

The study contributes to the literature by demonstrating that combining traditional marketing models with machine learning techniques results in more accurate and actionable segmentation, thereby enhancing the strategic value of customer analytics.

Findings

The empirical analysis conducted in this study provides robust evidence supporting the effectiveness of integrating the RFM model with K-Means clustering for customer segmentation in e-commerce environments. The findings demonstrate that data-driven segmentation techniques can successfully uncover latent behavioral structures, enabling the classification of customers into economically meaningful groups.

1. Validity and Robustness of the Clustering Model

The clustering results reveal a high degree of internal validity, as indicated by the Silhouette coefficient values ranging between 0.48 and 0.67, with no negative scores observed . In clustering analysis, a Silhouette value exceeding 0.5 is generally considered indicative of strong cluster cohesion and separation (Rousseeuw, 1987; Jain, 2010).

The absence of negative values confirms that all observations were correctly assigned to their respective clusters, thereby eliminating the possibility of misclassification. This finding highlights the effectiveness of the preprocessing stage, including outlier removal and Z-score normalization, in ensuring the stability and accuracy of the clustering algorithm (Han et al., 2011; Liu & Motoda, 2012).

Furthermore, the results of the one-way ANOVA test indicate statistically significant differences between clusters ($p < 0.001$), confirming that the segmentation is not arbitrary but reflects distinct and meaningful variations in customer behavior . This reinforces the reliability of the model and its suitability for practical applications in customer analytics (Fader et al., 2005).

2. Identification of Distinct Customer Segments

The analysis identified three clearly differentiated customer segments, each characterized by unique behavioral and economic attributes:

Segment C2: High-Value (Champion) Customers

This segment is distinguished by:

- High monetary value
- Frequent purchases
- Recent transactional activity

These customers represent the most profitable segment, contributing disproportionately to total revenue. Their behavioral profile indicates strong loyalty and sustained engagement, making them critical targets for retention strategies (Kumar & Reinartz, 2018).

Segment C3: Inactive or Lost Customers

This group is characterized by:

- High recency values (long inactivity periods)
- Low spending
- Minimal purchase frequency

The findings suggest that these customers have effectively disengaged from the platform, possibly due to competitive pressures or unsatisfactory experiences. From a strategic perspective, reactivation efforts for this segment may yield limited returns and should be carefully evaluated in terms of cost–benefit considerations (Lemon & Verhoef, 2016).

Segment C1: Regular or Potential Customers

This segment exhibits:

- Moderate RFM values
- Stable but limited purchasing behavior

These customers constitute the largest proportion of the customer base and represent a significant growth opportunity. With appropriate marketing interventions, such as personalized promotions and loyalty programs, they can potentially transition into high-value customers (Verhoef et al., 2016).

3. Strategic and Managerial Insights

The findings underscore the importance of differentiated marketing strategies tailored to specific customer segments. The segmentation results enable firms to:

- Prioritize retention efforts for high-value customers
- Optimize marketing expenditure by reducing investment in low-value segments
- Develop targeted growth strategies for potential customers

This approach aligns with the principles of customer relationship management, which emphasize the optimization of customer lifetime value through strategic resource allocation (Ngai et al., 2009; Davenport & Harris, 2017).

4. Methodological Contribution

From a methodological perspective, the study demonstrates that the integration of traditional marketing models with machine learning techniques results in more accurate and actionable segmentation outcomes. The use of clustering validation metrics and statistical testing enhances the robustness of the analysis, addressing limitations identified in previous studies (Chen et al., 2012).

Conclusion

This study set out to examine the effectiveness of combining the RFM model with K-Means clustering for customer segmentation in an e-commerce context. The findings confirm that the proposed hybrid analytical framework provides a robust, scalable, and practically relevant approach to understanding consumer behavior.

The results demonstrate that customer segmentation based on transactional data can yield clear and actionable insights, enabling firms to identify high-value customers, detect disengaged segments, and target growth opportunities. The integration of statistical validation techniques further ensures the reliability and credibility of the segmentation outcomes.

From a theoretical standpoint, the study contributes to the literature by bridging the gap between traditional marketing analytics and modern data science approaches, highlighting the value of hybrid models in capturing complex behavioral patterns. It reinforces the argument that consumer behavior can be effectively analyzed through quantitative proxies, particularly in data-rich environments such as e-commerce (Kotler & Keller, 2016; Ngai et al., 2009).

However, the study also acknowledges certain limitations. The RFM model, while effective, does not account for qualitative aspects of consumer behavior, such as preferences, motivations, and satisfaction. Future research should therefore consider integrating additional variables, including demographic and psychographic factors, as well as exploring more advanced machine learning techniques such as hierarchical clustering or neural networks.

In conclusion, the study provides both theoretical and practical contributions to the field of customer analytics, demonstrating that data-driven segmentation models can significantly enhance strategic decision-making and improve organizational performance in competitive digital markets.

Ethical Considerations

This study adheres to internationally recognized principles of research integrity and publication ethics. The research is based exclusively on the analysis of secondary, anonymized transactional data obtained from the UCI Machine Learning Repository, which is publicly available for academic use.

The dataset does not contain any personally identifiable information, and no human subjects were directly involved in the research process. Therefore, ethical approval from an institutional review board was not required.

All data processing, analysis, and reporting procedures were conducted in accordance with ethical standards, ensuring accuracy, transparency, and responsible use of data.

Conflict of Interest (COA Statement)

The authors declare that there is no conflict of interest regarding the publication of this article.

The research was conducted independently and without any commercial, financial, or personal relationships that could be perceived as influencing the results or interpretations presented in this study.

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Author Contributions

- Conceptualization: Dr. Ben Amara Salim
- Methodology: Dr. Ben Amara Salim, Dr. Chouireb Messaoud
- Software & Data Analysis: Dr. Ben Amara Salim
- Formal Analysis: Dr. Ben Amara Salim, Dr. Chouireb Messaoud
- Investigation: Dr. Chouireb Messaoud
- Writing – Original Draft: Dr. Ben Amara Salim
- Writing – Review & Editing: Dr. Ben Amara Salim, Dr. Chouireb Messaoud
- Supervision: Dr. Chouireb Messaoud

All authors have read and approved the final manuscript.

Data Availability Statement

The dataset used in this study is publicly available from the UCI Machine Learning Repository (*Online Retail II Dataset*).

All data utilized in the analysis can be accessed through the official repository. No additional proprietary data were used in this research.

AI Use Statement

The authors declare that no artificial intelligence (AI) tools were used in the design of the research, data analysis, or interpretation of results. AI-assisted tools may have been used solely for language editing and formatting purposes, without influencing the intellectual content, methodology, or conclusions of the study. The authors take full responsibility for the originality and accuracy of the work.

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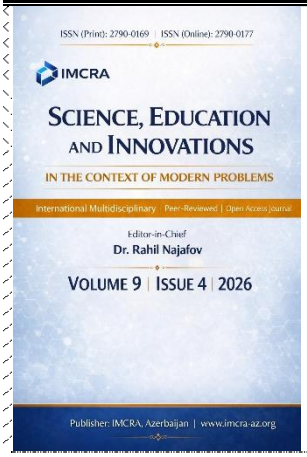
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RESEARCH ARTICLE

Reframing the Concept of "al-Majāl al-Tadāwulī" in the Philosophy of Taha Abderrahmane: Toward an Integrative Epistemological and Pragmatic Paradigm

Abd Elkarim Senani
University of Ez-Zitouna
Tunisia
E-mail: senani18abdelkarim@gmail.com

Selma Chouit
Professor
Department of Arabic Language and Literature, University – Jijel
Algeria
E-mail: Selmachouit18@gmail.com

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Abstract

In contemporary Arab-Islamic philosophy, the intellectual project of Taha Abderrahmane represents a distinctive attempt to reconstruct epistemological frameworks through an integrative and ethically grounded approach to knowledge production. This study offers a comprehensive and critical re-reading of the concept of "al-Majāl al-Tadāwulī" (the pragmatic field), positioning it as a central methodological and epistemological construct within Abderrahmane's broader philosophical system. Departing from conventional linguistic pragmatics, this article argues that al-Majāl al-Tadāwulī transcends its descriptive function to operate as a civilizational, integrative, and dynamic framework that governs the processes of communication, interaction, and knowledge construction within the Arab-Islamic intellectual tradition. Through a qualitative conceptual analysis and comparative philosophical approach, the study explores the semantic, epistemic, and functional dimensions of the concept, while also examining its intersections and divergences with modern Western pragmatics, particularly in relation to the works of Charles Morris and subsequent pragmatic theories. The findings demonstrate that Abderrahmane's conceptualization of the pragmatic field is grounded in a triadic structure encompassing language, creed, and knowledge, thereby offering an alternative paradigm that integrates ethical, cultural, and cognitive dimensions of discourse. This integrative model challenges reductionist and fragmentary readings of heritage by emphasizing continuity, interaction, and contextual embeddedness in the production and interpretation of meaning. Ultimately, the article contributes to contemporary debates in philosophy, linguistics, and intellectual history by foregrounding al-Majāl al-Tadāwulī as a foundational tool for rethinking the relationship between tradition and modernity, as well as between language, thought, and ethical practice. It further highlights the potential of Abderrahmane's framework to serve as a bridge between Arab-Islamic epistemologies and global philosophical discourse.

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1. Introduction

The emergence of contemporary Arab-Islamic philosophical thought has been marked by a series of intellectual efforts aimed at reconciling tradition with modernity, as well as reconfiguring inherited epistemological paradigms in light of global philosophical developments. Within this context, the work of Taha Abderrahmane occupies a prominent position,

as it proposes a distinctive and systematic rethinking of knowledge, language, and ethics through what may be described as an integrative philosophical project.

Unlike many modern approaches that adopt either a purely Western epistemological framework or a rigidly traditionalist stance, Abderrahmane advances a model that seeks to harmonize the Arab-Islamic intellectual heritage with contemporary philosophical inquiry. His project is not merely interpretative but fundamentally reconstructive, aiming to establish new methodological tools capable of addressing the complexities of modern intellectual life while remaining rooted in cultural and ethical authenticity.

Central to this project is the concept of *"al-Majāl al-Tadāwulī"* (the pragmatic field), which functions not only as a linguistic or communicative category but as a comprehensive epistemological framework governing the processes of interaction, meaning-making, and knowledge production. This concept reflects Abderrahmane's broader commitment to an integrative vision that rejects fragmentation and instead emphasizes the interconnectedness of linguistic, cognitive, and ethical dimensions.

Despite its theoretical significance, the notion of *al-Majāl al-Tadāwulī* has not received sufficient critical attention within contemporary scholarship, particularly in relation to its potential as a methodological alternative to dominant paradigms in Western pragmatics and discourse analysis. This gap underscores the need for a systematic re-examination of the concept, both in terms of its internal structure and its broader philosophical implications.

Accordingly, this study aims to provide a comprehensive analytical reading of *al-Majāl al-Tadāwulī*, addressing the following key questions:

- How is the concept defined within Abderrahmane's philosophical system?
- What are its foundational components and epistemological functions?
- In what ways does it differ from, and potentially extend, modern theories of pragmatics?
- How does it contribute to the realization of an integrative approach to Arab-Islamic heritage?

By addressing these questions, the article seeks to position *al-Majāl al-Tadāwulī* as a central concept in contemporary philosophical discourse and to highlight its relevance for rethinking the relationship between language, culture, and knowledge in both regional and global contexts.

Literature Review

The concept of pragmatics has evolved significantly within modern linguistic and philosophical traditions, particularly through foundational contributions by scholars such as Charles Morris, who initially conceptualized pragmatics as the study of the relationship between signs and their interpreters. This early semiotic framework was further developed by speech act theorists, notably John Searle and his predecessor J. L. Austin, who reconceptualized language as a form of action embedded within social contexts. These developments positioned pragmatics as a central field within linguistic inquiry, focusing on meaning as context-dependent and interactionally constructed.

Subsequent scholarship expanded pragmatics into a broader interdisciplinary domain encompassing sociolinguistics, discourse analysis, and philosophy of language. Works such as Levinson (1983) and Mey (2001) emphasized the role of context, intention, and inference in shaping meaning, while more recent contributions in journals such as *Journal of Pragmatics* (Elsevier) have highlighted intercultural and cognitive dimensions of pragmatic interaction (Kecskes, 2014; Haugh, 2013). These perspectives collectively underscore the dynamic and context-sensitive nature of communication, situating pragmatics as a key analytical tool for understanding discourse in diverse cultural settings.

Parallel to these developments in Western thought, contemporary Arab-Islamic philosophy has witnessed renewed efforts to articulate indigenous epistemological frameworks capable of engaging with global intellectual paradigms. Within this context, the work of Taha Abderrahmane represents a distinctive contribution, particularly through his formulation of *al-Majāl al-Tadāwulī* (the pragmatic field). Unlike conventional pragmatics, which primarily focuses on linguistic usage and communicative intent, Abderrahmane's concept extends into the ethical, civilizational, and epistemological dimensions of discourse.

Existing Arabic scholarship has explored various aspects of Abderrahmane's intellectual project, including its emphasis on creativity (Ben Addi, 2012), its critique of imitation (Boumenjel, 2017), and its integrative reading of heritage (Souilah, 2015). These studies highlight the centrality of concepts such as integration (*al-takāmul*), ethical grounding, and epistemic renewal. However, they often treat *al-Majāl al-Tadāwulī* as a secondary or supporting concept rather than as a foundational analytical framework.

Moreover, comparative studies between Abderrahmane's thought and Western pragmatics remain limited. While some works acknowledge superficial similarities—such as the shared emphasis on context and communication—they do not

sufficiently address the deeper epistemological divergence between the two traditions. In particular, Western pragmatics tends to operate within a secular and descriptive paradigm, whereas Abderrahmane's model integrates normative, ethical, and metaphysical dimensions, thereby offering a more holistic understanding of discourse.

This gap in the literature reveals the need for a systematic and critical re-examination of *al-Majāl al-Tadāwulī* as an independent conceptual framework. Specifically, there is a lack of studies that:

- analyze its internal structure (language, creed, knowledge),
- situate it within broader philosophical debates on meaning and communication,
- and evaluate its potential as an alternative to dominant paradigms in pragmatics and discourse analysis.

Accordingly, this study seeks to address these gaps by providing a comprehensive analytical reading of the concept, positioning it not merely as a linguistic tool but as a multidimensional epistemological model that bridges tradition and modernity.

3. Methodology

This study adopts a qualitative, conceptual, and comparative research design grounded in philosophical analysis and discourse-oriented inquiry. Given the abstract and theoretical nature of the subject, the methodology is primarily interpretive, aiming to reconstruct and critically evaluate the conceptual framework of *al-Majāl al-Tadāwulī* within the broader context of contemporary philosophy and linguistics.

3.1 Research Approach

The research is based on a qualitative analytical approach, which is particularly suitable for examining complex philosophical constructs and their underlying epistemological assumptions. This approach enables an in-depth exploration of meanings, relationships, and theoretical implications rather than relying on quantitative measurement.

3.2 Conceptual Analysis

A central component of the methodology is conceptual analysis, which involves:

- identifying the core elements of *al-Majāl al-Tadāwulī*,
- examining its semantic, functional, and epistemological dimensions,
- and clarifying its relationship to related concepts such as pragmatics, discourse, and communicative action.

This analytical process is grounded in primary texts by Taha Abderrahmane, as well as secondary interpretations within contemporary Arab scholarship.

3.3 Comparative Method

In order to situate the concept within global intellectual discourse, the study employs a comparative philosophical method, contrasting Abderrahmane's framework with key theories in Western pragmatics. This includes:

- semiotic pragmatics (Morris),
- speech act theory (Searle),
- and contemporary pragmatic models emphasizing context and interaction.

The comparison focuses on identifying both convergences (e.g., the role of context and communication) and divergences (e.g., the integration of ethical and metaphysical dimensions).

3.4 Discourse-Analytical Perspective

The study also incorporates elements of discourse analysis, particularly in examining how meaning is constructed within specific cultural and intellectual contexts. This perspective allows for a deeper understanding of how *al-Majāl al-Tadāwulī* functions not only as a theoretical construct but also as a practical framework for interpreting discourse within the Arab-Islamic tradition.

3.5 Data Sources

The analysis is based on:

- Primary sources: Key works by Taha Abderrahmane
- Secondary sources: Arabic and international scholarly literature

- Indexed journal articles: Especially from Elsevier and WoS databases (e.g., *Journal of Pragmatics*)

3.6 Research Contribution

By combining conceptual, comparative, and discourse-based methods, this study aims to:

- provide a systematic reconstruction of *al-Majāl al-Tadāwulī*,
- bridge the gap between Arab-Islamic and Western pragmatic theories,
- and propose an integrative epistemological model that contributes to ongoing debates in philosophy, linguistics, and cultural studies.

Conceptual Foundations and Delimitation of *al-Majāl al-Tadāwulī*

A central pillar of the philosophical project of Taha Abderrahmane lies in his rigorous conceptualization of *al-Majāl al-Tadāwulī* (the pragmatic field), which he articulates not merely as a linguistic or communicative notion but as a comprehensive epistemological and civilizational framework governing the dynamics of knowledge production and interaction. In this respect, Abderrahmane's contribution transcends classical pragmatics by embedding discourse within a multidimensional structure that integrates linguistic, cognitive, and ethical determinants.

Abderrahmane begins by establishing an exploratory semantic map of the term, grounding it in three interrelated linguistic significations: *transmission*, *communication*, and *interaction*. This tripartite rooting reflects a dynamic conception of language as an active process rather than a static system, aligning in part with the performative turn in philosophy of language initiated by J. L. Austin and further elaborated by John Searle. However, unlike these approaches, which primarily emphasize speech acts within bounded communicative situations, Abderrahmane expands the scope to encompass the broader socio-historical and civilizational conditions of discourse.

At the conceptual level, *al-Majāl al-Tadāwulī* is defined as the spatio-temporal locus of communication and interaction among the producers of heritage, encompassing both elite and popular actors within a given intellectual tradition. This definition situates the concept within a broader epistemological horizon, where discourse is not merely an exchange of signs but a historically embedded practice shaped by collective experience and cultural continuity. In this regard, Abderrahmane's formulation resonates with the hermeneutic insights of thinkers such as Gadamer (1989) and Ricoeur (1981), who similarly emphasize the historicity and situatedness of understanding.

To further clarify the specificity of the pragmatic field, Abderrahmane engages in a systematic comparative differentiation between *al-Majāl al-Tadāwulī* and several adjacent conceptual domains, namely the socio-cultural, ideational, and dialogical fields. This comparative strategy reflects a methodological rigor aimed at delineating conceptual boundaries while preserving analytical coherence.

First, in relation to the socio-cultural field, Abderrahmane argues that the pragmatic field is more selective and functionally oriented. While the socio-cultural domain encompasses all forms of knowledge, beliefs, and values present within a society, the pragmatic field is restricted to those elements that have achieved actualization through use and social circulation. This distinction aligns with contemporary pragmatic theories that prioritize usage-based meaning and contextual activation (Levinson, 1983; Kecskes, 2014), yet it extends them by emphasizing collective applicability and integration across the social body.

Second, the distinction between the pragmatic field and the ideational (ideological) field reveals a deeper epistemological divergence. Ideological systems, as Abderrahmane notes, tend to privilege normative evaluation over empirical realization, often subordinating reality to pre-established value structures. In contrast, the pragmatic field operates on a principle of epistemic duality, integrating both realization (*al-taḥaqquq*) and evaluation (*al-taqwīm*). This integrative logic parallels, yet ultimately surpasses, the communicative rationality proposed by Habermas (1984), as it embeds ethical considerations within a broader metaphysical and civilizational framework.

Third, Abderrahmane distinguishes the pragmatic field from the dialogical field, which is typically confined to the immediate context of interaction between speaker and addressee. While dialogical models—such as those found in discourse analysis and interactional linguistics (van Dijk, 2008; Wodak & Meyer, 2016)—focus on situational and temporal constraints, the pragmatic field is characterized by its comprehensiveness and permanence. It encompasses all forms of shared knowledge and belief that are continuously operative within a society, extending beyond momentary exchanges to include the cumulative and enduring dimensions of discourse.

From this perspective, *al-Majāl al-Tadāwulī* emerges as a meta-pragmatic construct, integrating elements of language, context, and intention while simultaneously incorporating ethical, cultural, and epistemological dimensions. This expanded framework challenges the reductionist tendencies of modern pragmatics, which often isolates linguistic phenomena from their broader ontological and civilizational contexts (Mey, 2001; Verschueren, 1999).

Moreover, Abderrahmane's insistence on the inseparability of knowledge and intention—where "there is no knowledge without intention and no intention without knowledge" —introduces a normative dimension that is largely absent in Western pragmatic theory. This principle not only reinforces the ethical grounding of discourse but also positions the pragmatic field as a site of integrative epistemic practice, where meaning is co-constructed through the interplay of cognition, belief, and social engagement.

In sum, the conceptual architecture of *al-Majāl al-Tadāwulī* reflects a sophisticated attempt to reconceptualize pragmatics within an integrative philosophical paradigm. By situating discourse at the intersection of language, culture, and ethics, Abderrahmane offers a framework that is both analytically rigorous and philosophically expansive, thereby opening new avenues for dialogue between Arab-Islamic thought and contemporary global scholarship.

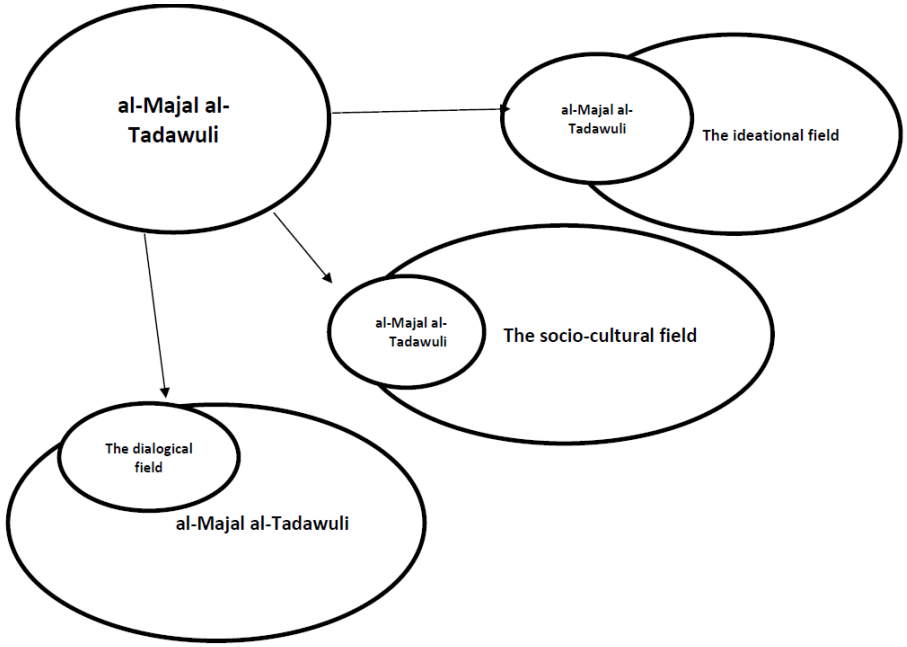

Figure 1. Conceptual Structure and Relational Positioning of *al-Majāl al-Tadāwulī* in Relation to the Socio-Cultural, Ideational, and Dialogical Fields. (Source: Adapted from Abderrahmane (n.d., pp. 246–247).

5. The Foundational Structure of the Pragmatic Field and Its Relation to Contemporary Pragmatics

The concept of *al-Majāl al-Tadāwulī* (the pragmatic field), as developed by Taha Abderrahmane, represents a sophisticated epistemological construct that transcends conventional linguistic paradigms and redefines the foundations of communicative and cognitive processes within the Arab-Islamic intellectual tradition. Rather than constituting a merely terminological innovation, the pragmatic field functions as a comprehensive theoretical framework for the construction, transmission, and realization of knowledge within a historically and culturally embedded context.

At the core of this framework lies a triadic foundation consisting of *language*, *creed*, and *knowledge*, which together form an integrated system governing the dynamics of discourse and interaction. This tripartite structure reflects a broader philosophical commitment to integration (*al-takāmul*), positioning the pragmatic field as both a methodological principle and an epistemological horizon (Al-Sahmudi, 2010). In this respect, Abderrahmane's model resonates with, yet significantly extends, the communicative paradigms articulated in modern philosophy of language, particularly those associated with Jürgen Habermas and his theory of communicative action, while simultaneously embedding these processes within a normative and civilizational framework.

5.1 Language as Identity and Epistemic Medium

Within Abderrahmane's framework, language is not reducible to a system of signs or a neutral medium of communication; rather, it constitutes the ontological and cultural identity of a community, embodying its historical consciousness and civilizational trajectory. This perspective diverges from structuralist and post-structuralist approaches that treat language primarily as a formal system (Saussure, 1916/1983), and instead aligns with hermeneutic and pragmatic traditions that emphasize the embeddedness of meaning in lived experience (Gadamer, 1989; Ricoeur, 1981).

Moreover, Abderrahmane posits that authentic thought cannot emerge outside the linguistic framework that shapes it, asserting that "thinking becomes sound only when it occurs within language" (Meshrouh, 2009). This claim parallels, to some extent, the philosophical insights of Ludwig Wittgenstein, particularly his notion that the limits of language define

the limits of thought. However, Abderrahmane advances this position by integrating linguistic competence with ethical and civilizational responsibility, thereby transforming language into a site of both epistemic and moral engagement.

Table 1. Comparative Analytical Framework of *al-Majāl al-Tadāwulī* and Contemporary Pragmatic Paradigms

Dimension	al-Majāl al-Tadāwulī (Pragmatic Field)	Classical Pragmatics (Western Tradition)	Critical Commentary & Epistemological Implications
Ontological Basis	Rooted in a civilizational and integrative ontology combining language, creed, and knowledge as interdependent structures (Abderrahmane, n.d.)	Primarily grounded in linguistic philosophy and semiotics, focusing on sign-user relations (Morris, 1938)	While Western pragmatics adopts a descriptive ontology, the pragmatic field introduces a normative-civilizational ontology, integrating ethical and metaphysical dimensions into discourse analysis
Core Analytical Focus	Communication as a holistic process of interaction, participation, and knowledge circulation within a socio-historical continuum	Communication as context-dependent meaning shaped by speaker intention and inference (Grice, 1975; Searle, 1969)	The pragmatic field expands beyond localized interaction to include collective epistemic processes, thereby redefining communication as a civilizational phenomenon
Conceptual Structure	Triadic model: Language – Creed – Knowledge (Abderrahmane, n.d.)	Triadic model: Language – Context – Intention (Levinson, 1983; Verschueren, 1999)	Abderrahmane's model introduces a normative and ethical dimension (creed) absent in Western pragmatics, transforming pragmatics into an epistemological framework
Role of Language	Language as identity, cultural memory, and epistemic medium shaping thought and civilization (Meshrouh, 2009)	Language as a system of signs enabling communication and meaning construction (Austin, 1962)	The pragmatic field elevates language from a functional tool to a civilizational structure, aligning with hermeneutic philosophy (Gadamer, 1989)
Role of Context	Context is historical, cultural, and civilizational, encompassing collective experience and heritage practices	Context is situational and interactional, limited to communicative events (Levinson, 1983)	The pragmatic field expands context into a macro-epistemological framework, bridging discourse and historical continuity
Temporal Scope	Extended and cumulative—covers all temporal layers of discourse within a tradition	Immediate and situational—restricted to specific communicative acts	This distinction highlights the pragmatic field as a longitudinal epistemic model, unlike the short-term focus of classical pragmatics
Epistemological Orientation	Integrative: combines realization (*fact*) and evaluation (*value*) (Abderrahmane, n.d.)	Predominantly descriptive and analytical, often separating fact from value (Habermas, 1984)	The pragmatic field overcomes the fact–value dichotomy, offering a unified epistemology of discourse
Scope of Application	Applies to heritage production, interpretation, and transmission, including intellectual, religious, and cultural systems	Applies primarily to linguistic communication and discourse analysis	The pragmatic field functions as a meta-theoretical framework, extending beyond linguistics into philosophy and cultural studies
Relation to Society	Emphasizes collective knowledge circulation and social integration	Focuses on individual speaker-hearer interaction	This shift reflects a movement from micro-level interaction to macro-level epistemic systems (van Dijk, 2008)
Methodological Function	Serves as a tool for integrative reading and reconstruction of heritage (Souilah, 2015)	Serves as a method for analyzing meaning in context	The pragmatic field transforms methodology into a comprehensive epistemological strategy

Philosophical Alignment	Aligns with integrative philosophy, ethical epistemology, and civilizational discourse	Aligns with analytic philosophy, linguistics, and cognitive science	Represents a shift from analytic reductionism to integrative holism (Ricoeur, 1981; MacIntyre, 1981)
Ultimate Aim	To achieve epistemic integration, ethical coherence, and civilizational continuity	To explain how meaning is generated and interpreted in communication	The pragmatic field redefines pragmatics as a normative project of knowledge reconstruction

5.2 Creed as Normative and Integrative Force

The second foundational component, *creed* (*al-ʿaqīda*), functions as the normative and spiritual core of the pragmatic field, providing coherence and direction to the processes of knowledge production and social interaction. In contrast to secular models of pragmatics, which often exclude metaphysical considerations, Abderrahmane situates discourse within a value-laden framework that integrates belief, ethics, and rationality.

This integration challenges the dichotomy between fact and value that characterizes much of modern Western epistemology (Putnam, 2002), and instead proposes a model in which knowledge is inherently tied to moral and spiritual commitments. Such a perspective finds partial resonance in the work of Alasdair MacIntyre, who similarly emphasizes the role of tradition and virtue in shaping rational inquiry, yet Abderrahmane extends this insight by grounding it explicitly in the Arab-Islamic heritage.

5.3 Knowledge as Dynamic and Expansive System

The third component, *knowledge*, is conceptualized as the totality of semantic contents and inferential mechanisms through which human understanding is expanded and the horizons of reality are disclosed. Unlike static conceptions of knowledge as a repository of information, Abderrahmane envisions it as a dynamic and interactive process, continuously shaped by linguistic articulation and creedal orientation.

Importantly, these cognitive processes cannot operate independently; rather, they are intrinsically linked to language and creed, forming an integrated epistemic system. This interdependence culminates in a fundamental principle articulated by Abderrahmane: *"There is no communication and no interaction in heritage except through knowledge mediated by language and grounded in creed"*. This principle underscores the inseparability of cognition, communication, and ethical orientation within the pragmatic field.

5.4 Reconfiguring Pragmatics: Beyond the Western Paradigm

A critical dimension of Abderrahmane's contribution lies in his redefinition of pragmatics itself. While classical pragmatics, as formulated by Charles Morris, focuses on the relationship between signs and their interpreters, and later developments—such as speech act theory (Searle, 1969) and Gricean pragmatics (Grice, 1975)—emphasize intention, context, and inference, these approaches remain largely confined to the analysis of linguistic interaction within bounded communicative situations.

By contrast, Abderrahmane expands the scope of pragmatics to include the civilizational, ethical, and epistemological conditions of discourse. His reformulation builds upon the classical tripartite division of semiotics—syntax, semantics, and pragmatics—but introduces a crucial addition: the centrality of the *user* as a morally and culturally situated agent. In doing so, he anticipates and extends contemporary developments in pragmatics that emphasize intercultural communication and socio-cognitive dimensions (Kecskes, 2014; van Dijk, 2008).

Furthermore, while modern pragmatics is often structured around the triad of language–context–intention (Levinson, 1983; Verschueren, 1999), Abderrahmane's model replaces this with a more comprehensive triad: language–creed–knowledge, thereby introducing a normative and integrative dimension absent from most Western frameworks. This shift transforms pragmatics from a descriptive discipline into a normative epistemology of discourse, capable of addressing not only how meaning is produced but also how it ought to be grounded and evaluated.

5.5 The Pragmatic Field versus Pragmatics

Despite certain conceptual overlaps, the distinction between *al-Majāl al-Tadāwulī* and conventional pragmatics is both fundamental and far-reaching. Pragmatics, as a linguistic discipline, primarily concerns itself with localized communicative acts, operating within the temporal and situational constraints of dialogue. As such, it remains closely aligned with what Abderrahmane terms the *dialogical field*.

In contrast, the pragmatic field operates at a broader spatio-temporal and epistemological level, encompassing the totality of communicative practices within a given civilization. It is not limited to individual interactions but extends to the cumulative and institutionalized forms of discourse that shape collective knowledge and identity. This distinction

highlights the transformative potential of Abderrahmane's framework, positioning it as a meta-theoretical model capable of bridging linguistic analysis, philosophical inquiry, and cultural critique.

6. The Realization of Integration through *al-Majāl al-Tadāwulī*: Toward an Integrative Epistemological Paradigm

The integrative vision (*al-ruʾya al-takāmuliyya*) advanced by Taha Abderrahmane constitutes one of the most distinctive features of his philosophical project, particularly in relation to the reading and reconstruction of Arab-Islamic heritage. Far from being a purely normative or subjective call, this vision is grounded in a coherent methodological framework structured around three principal determinants: the pragmatic field (*al-Majāl al-Tadāwulī*), interpenetration (*al-tadākhul*), and approximation (*al-taqrīb*). Together, these elements form a systematic approach aimed at overcoming epistemological fragmentation and re-establishing the unity of knowledge within a civilizational context.

Within this framework, the pragmatic field occupies a central and constitutive role, functioning simultaneously as the locus of integration and as the methodological lens through which integration is both enacted and interpreted. As Abderrahmane emphasizes, the concept of *tadāwul* (circulation) inherently implies processes of interaction, exchange, and participation, thereby situating knowledge production within a dynamic network of communicative relations. This understanding aligns with contemporary perspectives in discourse theory and social epistemology, which view knowledge as socially constructed and contextually embedded (Habermas, 1984; van Dijk, 2008), yet it extends these perspectives by embedding them within a broader ethical and civilizational framework.

At its core, *al-Majāl al-Tadāwulī* is defined as the spatio-temporal domain in which communication and interaction among the producers of heritage occur, encompassing both elite and popular actors within the intellectual tradition. This definition underscores the fundamentally relational and processual nature of heritage, challenging static and objectified conceptions that reduce it to a mere corpus of texts. Instead, heritage is reconceptualized as a living, dynamic system characterized by continuous interaction between its producers, transmitters, and interpreters.

This perspective stands in sharp contrast to what Abderrahmane identifies as the fragmentary approach (*al-ruʾya al-tajziʾiyya*), which isolates textual content from its generative mechanisms and socio-historical context. Such approaches, prevalent in certain strands of modern scholarship, tend to privilege analytical dissection over holistic understanding, thereby obscuring the integrative logic underlying the production of knowledge. Similar critiques have been articulated in Western philosophy, particularly by Michel Foucault and Paul Ricoeur, who emphasize the importance of discursive formations and hermeneutic contexts in shaping meaning. However, Abderrahmane's critique goes further by proposing an alternative epistemological model grounded in the internal logic of Arab-Islamic thought.

In this alternative model, integration is not merely a methodological preference but an ontological and epistemological necessity. Heritage, as Abderrahmane argues, cannot be adequately understood if detached from the conditions of its production, including the linguistic, cognitive, and ethical factors that shape its formation. Consequently, the pragmatic field serves as a mediating framework that reconnects textual content with its underlying processes, thereby enabling a more comprehensive and authentic interpretation.

Moreover, the integrative vision advanced by Abderrahmane challenges the notion of epistemological rupture, which has been influential in modern intellectual history (Bachelard, 2002). Rather than advocating a break with tradition, Abderrahmane emphasizes continuity, interaction, and renewal, arguing that heritage should be approached as a cumulative and evolving system of knowledge. This position resonates with the hermeneutic tradition (Gadamer, 1989), which views understanding as a dialogical process between past and present, yet it introduces a distinctive emphasis on ethical and civilizational coherence.

A key implication of this integrative approach is the rejection of the reduction of heritage to a purely textual or cognitive entity. As noted by Ould Babah (2010), heritage must be understood as a multidimensional phenomenon encompassing both content and mechanism, text and practice, history and lived reality. This holistic conception aligns with contemporary interdisciplinary approaches that seek to bridge the gap between textual analysis and social practice (Fairclough, 1995; Wodak & Meyer, 2016), while also highlighting the unique contribution of Abderrahmane's framework in integrating these dimensions within a unified epistemological system.

Furthermore, the integrative nature of Arab-Islamic heritage itself provides empirical support for Abderrahmane's theoretical claims. As Souilah (2015) demonstrates, the centrality of the Qur'anic text has historically generated an interconnected network of disciplines, including jurisprudence, legal theory, hadith studies, exegesis, and linguistic sciences, all of which are characterized by mutual interdependence and epistemic integration. This historical reality reinforces the argument that integration is not an imposed framework but an intrinsic feature of the intellectual tradition.

From this perspective, *al-Majāl al-Tadāwulī* emerges as a meta-epistemological construct that enables the reconstruction of heritage as an integrated system of knowledge. By foregrounding the processes of communication, interaction, and contextualization, it provides a robust methodological foundation for overcoming fragmentation and achieving a more comprehensive understanding of intellectual traditions.

7. Findings

The present study yields several significant findings regarding the conceptual structure, epistemological scope, and methodological implications of *al-Majāl al-Tadāwulī* as developed by Taha Abderrahmane. These findings contribute to a deeper understanding of the pragmatic field as an integrative framework that reconfigures the relationship between language, knowledge, and culture within the Arab-Islamic intellectual tradition.

7.1 The Pragmatic Field as a Meta-Epistemological Construct

The analysis demonstrates that *al-Majāl al-Tadāwulī* cannot be adequately understood as a mere extension of classical pragmatics. Rather, it functions as a meta-epistemological construct that transcends the descriptive boundaries of linguistic analysis. Unlike conventional pragmatics, which focuses on localized communicative acts, the pragmatic field operates at a broader level encompassing the historical, civilizational, and ethical conditions of discourse.

This finding aligns partially with the semiotic foundation established by Charles Morris, yet it extends beyond it by incorporating the moral and cultural situatedness of the speaking subject. Consequently, *al-Majāl al-Tadāwulī* redefines pragmatics as not only a theory of meaning but also a framework for understanding the production and circulation of knowledge within a living intellectual tradition.

7.2 The Triadic Epistemic Structure: Language–Creed–Knowledge

A central finding of this study is the identification and confirmation of the triadic structure underlying the pragmatic field, composed of:

- Language as the medium of articulation and identity,
- Creed as the normative and ethical foundation,
- Knowledge as the dynamic cognitive system.

This triadic configuration represents a fundamental departure from the dominant Western pragmatic model (language–context–intention) (Levinson, 1983; Verschueren, 1999). The inclusion of *creed* introduces a normative dimension that integrates values, belief systems, and ethical considerations into the structure of discourse.

As a result, meaning is not treated as a purely inferential or context-bound phenomenon but as a morally and epistemically grounded process, thereby challenging the descriptive neutrality characteristic of modern pragmatics (Habermas, 1984).

7.3 Integration as an Epistemological Principle Rather than a Methodological Option

The study finds that integration (*al-takāmul*) in Abderrahmane's thought is not merely a methodological preference but an epistemological necessity. The pragmatic field serves as the primary mechanism through which this integration is realized, enabling the synthesis of:

- textual and contextual dimensions,
- cognitive and ethical components,
- historical continuity and contemporary interpretation.

This finding contrasts with fragmentary approaches that isolate textual content from its socio-historical and epistemic conditions. Instead, *al-Majāl al-Tadāwulī* establishes a holistic framework in which knowledge is produced through interaction, circulation, and contextual embedding, rather than through abstraction or reduction.

7.4 Reconfiguration of the Concept of Context

Another key finding concerns the expanded notion of context within the pragmatic field. While classical pragmatics limits context to situational and interactional parameters, this study shows that Abderrahmane reconceptualizes context as:

- historical,
- civilizational,
- and collectively constituted.

This broader understanding aligns with discourse-oriented approaches (e.g., van Dijk, 2008) but goes further by embedding context within a continuum of cultural memory and epistemic tradition. Consequently, discourse is interpreted not as an isolated act but as part of a larger network of meaning shaped by cumulative intellectual practices.

7.5 The Centrality of the Ethical Dimension in Discourse

A significant finding of this study is the central role of ethics within the pragmatic field. The inseparability of knowledge and intention—emphasized in Abderrahmane's framework—indicates that discourse is inherently value-laden. This stands in contrast to many Western pragmatic theories, which tend to treat meaning as functionally or cognitively determined.

By integrating ethical considerations into the structure of communication, *al-Majāl al-Tadāwulī* transforms discourse into a site of moral engagement and responsibility, thereby expanding the scope of pragmatics into the domain of ethical epistemology.

7.6 Bridging Arab-Islamic and Western Epistemological Traditions

The comparative analysis reveals that *al-Majāl al-Tadāwulī* serves as a bridging framework between Arab-Islamic and Western intellectual traditions. While it shares certain analytical concerns with classical pragmatics—such as the importance of context and communication—it introduces a distinct epistemological orientation grounded in integration, continuity, and ethical coherence.

This finding suggests that Abderrahmane's model has the potential to contribute to global philosophical discourse, particularly in areas related to:

- intercultural pragmatics,
- discourse theory,
- and philosophy of language.

7.7 The Pragmatic Field as a Methodological Tool for Heritage Reconstruction

Finally, the study finds that *al-Majāl al-Tadāwulī* functions as a methodological instrument for the reconstruction and reinterpretation of heritage. By reconnecting textual content with its generative conditions, the pragmatic field enables a more nuanced and comprehensive reading of intellectual traditions.

This approach not only preserves the continuity of heritage but also facilitates its renewal, allowing it to engage with contemporary challenges without losing its epistemological integrity.

Conclusion

This study has demonstrated that the concept of *al-Majāl al-Tadāwulī*, as articulated by Taha Abderrahmane, constitutes a foundational element in the development of an integrative epistemological framework for the analysis of Arab-Islamic heritage. By situating discourse within a dynamic network of linguistic, cognitive, and ethical relations, the pragmatic field transcends conventional approaches to pragmatics and offers a multidimensional model for understanding the processes of knowledge production and interpretation.

Two principal conclusions may be drawn. First, the analysis confirms the procedural and epistemological significance of terminological innovation in Abderrahmane's thought. Concepts such as *al-Majāl al-Tadāwulī* function not merely as descriptive tools but as generative frameworks that illuminate the underlying structures of knowledge and discourse. In this sense, terminology becomes, as Abderrahmane suggests, the "light of the sciences" through which intellectual reality is revealed.

Second, the study establishes that the pragmatic field operates as a comprehensive reading system for heritage, enabling the integration of textual, contextual, and ethical dimensions within a unified analytical framework. By bridging the gap between tradition and modernity, as well as between Arab-Islamic and Western epistemologies, this concept offers significant potential for advancing contemporary debates in philosophy, linguistics, and cultural studies.

Ultimately, the findings suggest that Abderrahmane's integrative model provides not only a critical response to the limitations of fragmentary approaches but also a constructive pathway toward a more holistic and context-sensitive understanding of knowledge in an increasingly interconnected intellectual landscape.

Ethical Approval

This study does not involve human participants, animals, or sensitive personal data. Therefore, ethical approval from an institutional review board was not required. The research is based exclusively on conceptual, philosophical, and textual analysis of published sources.

Informed Consent

Not applicable. This study does not involve human subjects or personal data requiring informed consent.

Consent for Publication

Not applicable.

Data Availability Statement

No new data were generated or analyzed in this study. All sources used are publicly available academic publications. Any supporting materials can be obtained from the corresponding author upon reasonable request.

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The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Author Contributions

- Abd Elkarim Senani: Conceptualization, methodology, formal analysis, writing – original draft preparation.
- Prof. Selma Chouit: Supervision, validation, writing – review and editing, academic guidance.

All authors have read and approved the final version of the manuscript.

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Declaration of Generative AI and AI-Assisted Technologies

The authors declare that generative artificial intelligence (AI) tools were used solely for linguistic refinement and academic editing purposes. All intellectual content, conceptual development, analysis, and interpretations presented in this study are the original work of the authors. The authors take full responsibility for the accuracy, integrity, and originality of the manuscript.

Research Integrity Statement

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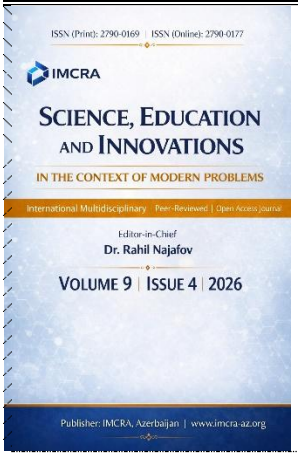
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RESEARCH ARTICLE

Communication Mechanisms of Forestry Institutions in Addressing Environmental Challenges: A Strategic and Analytical Study of the Forestry Department of Ghardaia Province

Neche Azouz
Dr.
University Center of Barika
Algeria
E-mail: azouz.neche@cu-barika.dz

Keywords Environmental Communication; Forestry Governance; Communication Mechanisms; Desertification; Environmental Policy; Algeria

Abstract

In the context of escalating environmental degradation and increasing ecological vulnerability in arid and semi-arid regions, the role of institutional communication has emerged as a critical determinant of environmental governance effectiveness. This study investigates the communication mechanisms employed by the Forestry Department of Ghardaia Province (Algeria) in addressing pressing environmental challenges, including desertification, soil erosion, pollution, and illegal hunting activities. Adopting an analytical and descriptive research design, the study evaluates the structure, channels, and strategic orientation of environmental communication practices within the forestry administration. It further examines the extent to which these mechanisms contribute to awareness-raising, behavioral change, stakeholder engagement, and policy implementation. Particular emphasis is placed on environmental communication as a multidimensional process that integrates information dissemination, participatory governance, and socio-ecological resilience building. The findings suggest that while the Forestry Department utilizes a range of traditional and modern communication tools—such as awareness campaigns, educational outreach, media engagement, and inter-institutional coordination—there remain structural and operational limitations that hinder optimal effectiveness. These include insufficient digital transformation, limited community participation, and gaps in strategic communication planning. The study concludes by proposing a comprehensive framework for enhancing environmental communication through digitalization, participatory approaches, and integrated policy alignment. It contributes to the broader discourse on sustainable environmental governance in developing regions by highlighting the central role of communication in mitigating ecological risks and fostering long-term environmental sustainability.

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1. Introduction

In contemporary societies, communication constitutes a fundamental pillar of social organization, enabling the exchange of information, coordination of actions, and construction of shared meanings among individuals and institutions. Beyond its traditional informational function, communication has evolved into a strategic instrument for governance, development, and crisis management. In this regard, it plays a particularly vital role in addressing complex and multidimensional challenges such as environmental degradation.

The increasing severity of environmental problems—ranging from climate change and biodiversity loss to desertification and pollution—has necessitated the development of integrated approaches that combine scientific knowledge, institutional action, and societal engagement. Within this framework, environmental communication has emerged as a key mechanism for

promoting awareness, influencing behavior, and facilitating collective action. It serves not only as a tool for disseminating environmental information but also as a platform for dialogue, participation, and decision-making among stakeholders.

In the Algerian context, environmental challenges have intensified in recent decades due to rapid demographic growth, accelerated urbanization, and expanding industrial activities. These dynamics have exerted significant pressure on natural ecosystems, particularly in vulnerable regions such as Ghardaia Province, which is characterized by arid climatic conditions and fragile ecological balance. Issues such as desertification, soil erosion, pollution, and illegal exploitation of natural resources have become increasingly prominent, posing serious threats to both environmental sustainability and human well-being.

Against this backdrop, governmental institutions—especially forestry departments—play a central role in environmental protection and natural resource management. The Forestry Department of Ghardaia Province, as a key administrative body, is tasked with implementing environmental policies, managing forest ecosystems, and combating ecological degradation. However, the effectiveness of these efforts is closely linked to the department's ability to design and implement efficient communication strategies that engage local communities, raise environmental awareness, and foster responsible environmental behavior.

This study is situated at the intersection of communication studies and environmental governance. It seeks to analyze the communication mechanisms adopted by the Forestry Department of Ghardaia Province and to evaluate their effectiveness in addressing environmental problems. By focusing on both structural and functional dimensions of communication, the research aims to provide a comprehensive understanding of how institutional communication can contribute to sustainable environmental management.

Furthermore, the study underscores the importance of transitioning from traditional, top-down communication models to more participatory and interactive approaches that empower local communities and enhance institutional transparency. In doing so, it contributes to the growing body of literature that emphasizes the role of communication as a transformative force in achieving environmental sustainability and resilience in developing countries.

2. Literature Review

2.1. Theoretical Foundations of Environmental Communication

Environmental communication has evolved into a distinct interdisciplinary field that integrates insights from communication studies, environmental sciences, sociology, and public policy. It is broadly conceptualized as the process through which information, values, and meanings related to environmental issues are constructed, disseminated, and negotiated among individuals, institutions, and societies (Cox, 2013). Beyond its informational function, environmental communication plays a transformative role by shaping public perceptions, influencing attitudes, and fostering behavioral change toward environmental sustainability.

Scholarly literature emphasizes that environmental communication operates within the public sphere, where competing narratives, scientific knowledge, and socio-political interests intersect (Moser, 2016). In this context, communication is not merely a neutral transmission of facts but a strategic process involving framing, persuasion, and engagement. For instance, framing theory suggests that the way environmental issues are presented significantly affects public understanding and policy support (Nisbet, 2009). Consequently, effective communication strategies must consider cultural, social, and cognitive dimensions to enhance their impact.

Furthermore, the complexity of environmental problems—often described as "wicked problems"—requires communication approaches that are adaptive, participatory, and multidimensional (Liu et al., 2007). These challenges necessitate a shift from traditional top-down information dissemination models to more interactive and dialogic forms of communication that enable collaboration among stakeholders.

2.2. Communication Mechanisms in Environmental Governance

In the framework of environmental governance, communication mechanisms serve as essential tools for policy implementation, stakeholder coordination, and public engagement. These mechanisms encompass a wide range of channels, including mass media, institutional campaigns, educational programs, community outreach initiatives, and digital communication platforms.

Research highlights that effective environmental governance depends not only on regulatory frameworks but also on the capacity of institutions to communicate policies and mobilize collective action (Reed, 2008). Stakeholder participation, in particular, has been identified as a critical factor in enhancing environmental decision-making processes. Participatory communication fosters trust, legitimacy, and shared responsibility, thereby improving policy outcomes and compliance.

In addition, adaptive co-management approaches emphasize the role of communication in facilitating learning, knowledge exchange, and collaboration across multiple levels of governance (Berkes, 2009). These approaches integrate scientific expertise with local knowledge, enabling more context-sensitive and sustainable solutions. Communication, in this sense, acts as a bridge between institutions and communities, promoting mutual understanding and coordinated action.

However, several studies indicate that institutional communication mechanisms often face limitations, such as bureaucratic rigidity, lack of transparency, and insufficient integration of digital technologies. These challenges can hinder the effectiveness of environmental policies, particularly in developing countries where institutional capacities may be constrained.

2.3. Environmental Awareness and Behavioral Change

A central objective of environmental communication is to enhance public awareness and promote environmentally responsible behavior. Empirical research demonstrates that awareness alone is insufficient to drive behavioral change; rather, communication strategies must address psychological, social, and cultural factors that influence individual and collective actions (Lee et al., 2015).

Behavioral theories, such as the Theory of Planned Behavior, suggest that attitudes, subjective norms, and perceived behavioral control play a significant role in shaping environmental actions. Therefore, communication initiatives should be designed to not only inform but also motivate and empower individuals to adopt sustainable practices.

Educational and outreach programs have been widely recognized as effective tools for fostering environmental awareness. These programs often involve schools, community organizations, and local stakeholders, creating opportunities for experiential learning and social interaction (Jacobson et al., 2015). Moreover, the use of media and digital platforms has expanded the reach and impact of environmental communication, enabling real-time dissemination of information and interactive engagement with audiences.

Despite these advancements, the literature points to persistent gaps between awareness and action, commonly referred to as the "value-action gap." Addressing this gap requires more integrated and context-specific communication strategies that align environmental messages with local needs, values, and socio-economic realities.

2.4. Environmental Challenges in Arid Regions and the Algerian Context

Arid and semi-arid regions, such as Ghardaia Province in Algeria, are particularly vulnerable to environmental degradation due to their fragile ecosystems and limited natural resources. Key challenges include desertification, soil erosion, water scarcity, biodiversity loss, and pollution. These issues are often exacerbated by human activities, including overgrazing, deforestation, urban expansion, and unsustainable resource exploitation.

In Algeria, environmental problems have intensified in recent decades as a result of rapid population growth, urbanization, and industrialization. These dynamics have placed significant pressure on natural ecosystems, highlighting the need for effective environmental management and governance strategies.

The forestry sector plays a crucial role in addressing these challenges, particularly in combating desertification and preserving biodiversity. Forestry departments are responsible for implementing policies, managing natural resources, and raising environmental awareness among local populations. However, their effectiveness depends largely on their ability to communicate with stakeholders and mobilize community participation.

Studies on environmental governance in developing countries indicate that institutional effectiveness is often constrained by limited resources, weak coordination, and insufficient public engagement (Reddy & Behera, 2006). In this context, strengthening communication mechanisms becomes essential for enhancing institutional performance and achieving sustainable environmental outcomes.

2.5. Research Gap and Contribution of the Study

Although the existing literature provides valuable insights into environmental communication and governance, there remains a significant gap in empirical studies focusing on local institutional practices, particularly in the context of developing countries and arid regions. Most research has concentrated on global or national-level analyses, with limited attention to the operational dynamics of local administrative bodies such as forestry departments.

Moreover, there is a lack of integrated studies that examine communication mechanisms as both structural and functional components of environmental management. Specifically, few studies have explored how communication strategies are designed, implemented, and evaluated within institutional frameworks, and how they influence environmental outcomes at the local level.

This study addresses these gaps by providing an in-depth analysis of the communication mechanisms employed by the Forestry Department of Ghardaia Province. It contributes to the literature by:

- Offering a localized perspective on environmental communication practices
- Evaluating the effectiveness of institutional communication in addressing specific environmental challenges
- Proposing a strategic framework for improving communication mechanisms in similar contexts

By bridging the gap between theory and practice, the study aims to enhance understanding of the role of communication in environmental governance and to support the development of more effective and sustainable environmental policies.

3. Methodological Framework of the Study

3.1. Research Problem

Communication constitutes a fundamental and indispensable component of social systems, playing a central role in structuring interactions, facilitating coordination, and enabling the exchange of information across institutional and societal levels. Within contemporary governance frameworks, communication is not merely a supportive function but a strategic instrument through which institutions influence behavior, mobilize stakeholders, and address complex societal challenges.

As emphasized in the study context, no institution—regardless of its structure, function, or objectives—can operate effectively in the absence of communication mechanisms that connect internal actors with the external environment . This assertion is particularly relevant in the domain of environmental protection, where communication directly impacts public awareness, risk perception, and behavioral change (Cox, 2013; Moser, 2016).

Environmental problems have become increasingly complex and multidimensional, encompassing both natural and anthropogenic dimensions. While certain environmental challenges, such as natural disasters, are beyond direct human control, many others—such as desertification, soil erosion, pollution, and illegal hunting—are primarily driven by unsustainable human practices . These issues require coordinated institutional responses supported by effective communication strategies that promote awareness, participation, and compliance.

In this context, the Forestry Department represents a key governmental institution responsible for environmental protection and natural resource management. Its role extends beyond regulatory enforcement to include communication-based interventions aimed at educating the public, influencing environmental behavior, and fostering collective responsibility. However, the effectiveness of these efforts depends largely on the nature, structure, and efficiency of the communication mechanisms employed.

Accordingly, the central research problem of this study can be formulated as follows:

What communication mechanisms are employed by the Forestry Department of Ghardaia Province in combating environmental problems, and to what extent are these mechanisms effective?

3.2. Research Questions

In order to address the research problem in a systematic and comprehensive manner, the study is guided by the following research questions:

1. What is the role of communication mechanisms used by the Forestry Department of Ghardaia Province in addressing environmental problems?
2. What are the main environmental challenges targeted by the Forestry Department in Ghardaia Province?
3. What are the key obstacles and limitations faced by the Forestry Department in implementing effective communication strategies?

These questions aim to capture both the structural and functional dimensions of communication within the institutional context.

3.3. Objectives of the Study

The study seeks to achieve the following objectives:

- To identify and analyze the communication mechanisms and tools employed by the Forestry Department in combating environmental problems
- To examine the major environmental challenges addressed by the institution, particularly in the context of Ghardaia Province
- To evaluate the effectiveness of these communication mechanisms in promoting environmental awareness and behavioral change
- To identify the main constraints and challenges limiting the efficiency of institutional communication
- To propose strategic recommendations for improving environmental communication practices

These objectives reflect a comprehensive approach that integrates analytical, evaluative, and applied dimensions of research.

3.4. Significance of the Study

The significance of this study lies in its focus on environmental communication as a critical component of sustainable development and environmental governance. Environmental issues are inherently collective in nature, requiring the active participation of both governmental institutions and society at large. As such, communication mechanisms represent a vital link between policy formulation and public engagement.

This study contributes to the academic and practical understanding of how communication can be utilized as a tool for environmental protection. It highlights the role of forestry institutions in addressing environmental challenges and emphasizes the importance of raising awareness and fostering community participation .

Furthermore, the study is particularly relevant in the context of developing countries, where environmental challenges are often exacerbated by limited resources, institutional constraints, and socio-economic pressures. By focusing on the Ghardaia Province, the research provides valuable insights into local environmental dynamics and institutional practices.

3.5. Research Methodology

In order to ensure scientific rigor and methodological validity, the study adopts a descriptive-analytical approach, which is widely recognized in social and communication sciences as an effective method for analyzing real-world phenomena.

Scientific methodology, in this context, refers to a structured set of logical and systematic procedures that enable the researcher to collect, analyze, and interpret data objectively, thereby generating reliable and valid conclusions .

The descriptive-analytical method is particularly suitable for this study for several reasons:

- It allows for an in-depth examination of communication mechanisms within their real institutional context
- It facilitates the analysis of relationships between variables, such as communication practices and environmental outcomes
- It enables the interpretation of empirical data in light of theoretical frameworks

This approach is consistent with previous studies in environmental communication and governance, which emphasize the importance of context-specific analysis (Reed, 2008; Berkes, 2009).

3.6. Research Design and Field Study

The study is based on a field research design, which involves direct engagement with the target population to collect primary data. Field studies are particularly important in communication research, as they provide insights into actual practices, perceptions, and experiences of stakeholders.

In this study, data were collected from respondents associated with the Forestry Department of Ghardaia Province, including employees and relevant stakeholders. The use of field-based data enhances the validity and reliability of the findings by grounding the analysis in empirical evidence.

3.7. Data Collection Tools

Data collection constitutes a critical stage in the research process, as it provides the empirical foundation for analysis and interpretation. In this study, multiple data collection tools were employed to ensure comprehensive coverage of the research problem.

The primary tools used include:

- Observation: to monitor communication practices and institutional interactions in their natural setting
- Interviews: to gather in-depth qualitative insights from key informants and stakeholders

These tools are widely used in social research due to their ability to capture both quantitative and qualitative dimensions of phenomena (Mursli, 2007). They allow the researcher to obtain accurate and context-sensitive data, thereby enhancing the analytical depth of the study.

3.8. Justification of Methodological Choices

The selection of the descriptive-analytical method, combined with field-based data collection techniques, is justified by the nature of the research problem, which requires both empirical investigation and theoretical interpretation.

Environmental communication is a complex and context-dependent phenomenon that cannot be adequately understood through purely quantitative or purely theoretical approaches. Instead, it requires an integrated methodology that captures the interactions between institutional practices, communication processes, and environmental outcomes.

By adopting this methodological framework, the study ensures a balanced and comprehensive analysis, contributing to both academic knowledge and practical applications in the field of environmental governance.

Observation, Interview, Population, and Conceptual Definitions

Observation

Observation constitutes a fundamental methodological instrument in social and communication research, enabling the systematic examination of institutional practices within their natural context. In the present study, observation was employed during the preliminary exploratory phase to identify key patterns, behaviors, and communication dynamics within the Forestry Department. This phase involved non-intrusive monitoring of activities, allowing for the recording and documentation of critical elements related to environmental communication processes.

In addition to preliminary observation, the study incorporated participant observation, which provided deeper analytical insight into the internal functioning of communication mechanisms within the department. Through direct engagement, the researcher was able to examine the actual practices of communication, including the techniques, channels, and tools utilized in addressing environmental challenges such as desertification, forest degradation, and illegal hunting.

Furthermore, observation facilitated the analysis of message flows within the institution, particularly the types of communication exchanged among employees during the execution of their professional duties. This approach aligns with contemporary methodological perspectives, which emphasize the importance of observation in capturing real-time interactions and contextualized behaviors that cannot be fully understood through secondary data alone (Bryman, 2016; Creswell, 2014).

Interview

The interview method represents a central qualitative data collection tool, particularly suitable for exploring perceptions, experiences, and institutional practices in communication studies. In this research, interviews were conceptualized as oral survey instruments, whereby respondents provide verbal responses that are subsequently recorded and analyzed by the researcher .

A structured interview format was adopted to ensure consistency and comparability of responses across participants. This method allows for the systematic collection of data while maintaining a clear focus on predefined research themes. Within this framework, an in-depth interview was conducted with the communication officer of the Forestry Department, providing valuable insights into the strategies, challenges, and operational realities of environmental communication practices.

The use of structured interviews enhances the reliability of qualitative data while allowing for analytical rigor in interpretation. As noted in qualitative research literature, interviews are essential for uncovering the subjective dimensions of institutional processes, particularly in areas such as communication, where meaning and interpretation play a critical role (Kvale, 2007; Silverman, 2013).

Study Population and Sample

Research Population

The research population refers to the comprehensive set of elements relevant to the phenomenon under investigation, encompassing individuals, institutions, or activities that form the focus of the study. In the context of this research, the population includes institutional actors within the Forestry Department of Ghardaia Province, which serves as the primary administrative body responsible for environmental management and protection in the region.

This population was deliberately selected due to its direct involvement in environmental governance, policy implementation, and communication activities aimed at raising awareness and mitigating environmental risks. The Forestry Department, as an institutional entity, represents a critical interface between governmental policy and community engagement.

Sample Selection

The study relies on a purposive sampling strategy, focusing on individuals with direct expertise and involvement in communication processes within the Forestry Department. Such a sampling approach is widely adopted in qualitative research to ensure that selected participants possess relevant knowledge and experience necessary for addressing the research objectives (Patton, 2002).

Defining Concepts and Terminology

1. Communication

From a linguistic perspective, the term “communication” originates from the Latin word *communicum*, which denotes sharing, participation, or commonality, reflecting the fundamental idea of mutual exchange (Hijab, 2003) .

From a theoretical standpoint, communication is understood as a dynamic and interactive process involving the transmission, exchange, and interpretation of messages between individuals or groups. This process requires the presence of feedback—whether immediate or delayed—to ensure continuity and effectiveness. In the absence of feedback, communication becomes a one-directional transmission rather than a reciprocal interaction (Makawi & Al-Sayed, 1998) .

Operationally, within the framework of this study, communication is defined as:

A structured and interactive process through which information, ideas, and environmental messages are transmitted and exchanged between institutional actors and stakeholders using various tools and channels, with the objective of influencing behavior and achieving specific environmental outcomes.

This definition is consistent with contemporary environmental communication theories, which emphasize participation, feedback, and behavioral impact (Cox, 2013; Ockwell et al., 2009).

2. Environment

Linguistically, the concept of the environment in Arabic derives from the root associated with settlement and habitation, reflecting the idea of a space in which human life is organized and sustained (Ibn Manzur) .

From a technical perspective, the environment is defined as the comprehensive framework within which humans live and interact, encompassing both natural and social dimensions. It includes all physical, biological, and socio-cultural elements that influence human life and are, in turn, influenced by human activities (Al-Najjar, 2004) .

Operationally, the environment in this study refers to:

An integrated system of natural and human-made elements—including air, soil, water, biodiversity, and built environments—that interact dynamically to sustain life and shape human activities.

3. Environmental Problems

Environmental problems are broadly conceptualized as disruptions or imbalances within ecological systems that hinder their ability to sustain life and maintain equilibrium. These problems may arise from natural processes or anthropogenic activities, often resulting in significant ecological, economic, and social consequences .

Operationally, environmental problems are defined in this study as:

Any alteration in natural systems—whether caused by human actions or natural factors—that leads to the degradation of environmental quality, disrupts ecological balance, and negatively impacts human life.

Examples include desertification, soil erosion, environmental pollution, and illegal exploitation of natural resources.

Communication Mechanisms of the Forestry Department in Ghardaia Province

The Forestry Department of Ghardaia Province operates as a key institutional actor in environmental protection, functioning within the legal framework established by Executive Decree No. 95-333 (1995). Since the commencement of its activities in 1996, the department has assumed responsibility for implementing national forestry policies at the regional level.

Organizational Structure and Functions

The department is organized into specialized units responsible for resource management, environmental protection, and administrative coordination. Its core functions include:

- Development and protection of forest and natural resources
- مكافحة التصحر والانجراف combating desertification and erosion
- Monitoring and regulation of resource exploitation
- Fire prevention and environmental risk management
- Biodiversity conservation and wildlife protection
- Environmental awareness and outreach programs

These functions demonstrate the integration of regulatory, managerial, and communicative roles within the institution.

Communication Mechanisms in Combating Environmental Problems

The Forestry Department employs a diverse set of communication mechanisms to address environmental challenges and promote sustainability. These include:

- Field visits and direct community engagement, enabling face-to-face communication and localized awareness-building
- Environmental awareness campaigns, aimed at educating the public about ecological risks and sustainable practices
- Local radio broadcasting, which serves as an accessible medium for disseminating environmental information
- Open days and participatory events, organized in collaboration with civil society organizations and local authorities

These mechanisms reflect a hybrid communication model that combines traditional outreach methods with participatory approaches, fostering collaboration between the institution and the community. Such strategies are consistent with participatory communication frameworks, which emphasize dialogue, inclusion, and collective action as essential components of effective environmental governance (Reed, 2008; Berkes, 2009).

Communication Mechanisms and Empirical Findings

Meetings

Meetings constitute a central and structured communication mechanism within the Forestry Directorate, serving both internal coordination and external engagement functions. Internally, meetings facilitate the exchange of information among departments, districts, and staff members, thereby ensuring coherence in decision-making processes and operational alignment. Externally, they provide a platform for interaction with stakeholders, including local authorities, civil society organizations, and community representatives.

From a theoretical perspective, meetings can be understood as interactive communication forums that enable dialogue, negotiation, and collective problem-solving. Such mechanisms are particularly critical in environmental governance, where complex challenges require coordinated and multi-actor responses (Reed, 2008; Berkes, 2009).

In the context of the Forestry Directorate, meetings contribute to the development of collaborative strategies aimed at addressing environmental problems, including desertification, forest degradation, and fire risks. They also enhance institutional transparency and foster trust among stakeholders, which are essential components of effective environmental management.

Brochures

Brochures represent an important informational and persuasive communication tool used by the Forestry Directorate to engage with the external public. These materials are designed to simplify complex environmental information and present it in an accessible and visually appealing format, thereby enhancing public understanding and awareness.

The distribution of brochures during field visits, awareness campaigns, and open days reflects a targeted communication strategy aimed at reaching diverse segments of society . Their effectiveness is particularly evident during environmentally significant events, such as World Environment Day, where they serve as instruments for promoting pro-environmental attitudes and behaviors.

A notable example is the brochure titled *"Awareness Campaign for the Prevention of Palm Tree and Agricultural Crop Fires,"* which addresses one of the most pressing environmental issues in the region. By outlining the causes, consequences, and preventive measures related to forest fires, the brochure not only informs but also guides public behavior. The inclusion of visual elements, such as images of burned palm trees, enhances emotional engagement and reinforces the urgency of the message.

This approach aligns with communication theories emphasizing the importance of visual and narrative framing in influencing public perception and behavior (Nisbet, 2009; Ockwell et al., 2009).

Field Visits

Field visits constitute a highly effective form of direct, face-to-face communication, enabling the Forestry Directorate to engage with local communities in a contextualized and participatory manner. These visits allow for the dissemination of environmental knowledge while simultaneously providing opportunities for dialogue and feedback.

As highlighted in the study, field visits are often conducted in coordination with multiple stakeholders, including local authorities, the National Gendarmerie, civil protection units, and civil society organizations. This multi-actor collaboration reflects a networked governance approach, which is increasingly recognized as essential for addressing complex environmental challenges (Armitage et al., 2007).

Field visits also play a critical role in emergency response situations, such as forest fires, where rapid intervention and coordinated action are necessary to minimize damage. The integration of awareness-raising activities with operational interventions enhances both the immediate and long-term effectiveness of environmental management efforts.

From a theoretical standpoint, such direct engagement mechanisms are consistent with participatory communication models, which emphasize the importance of interaction, trust-building, and community involvement in achieving sustainable outcomes (Pretty, 2003).

Audiovisual Media

Radio

Radio remains one of the most accessible and inclusive communication channels, particularly in regions with diverse socio-economic and educational backgrounds. The Forestry Directorate utilizes radio broadcasts to disseminate environmental information and raise awareness among the general public.

Radio programs are strategically aligned with international environmental events, such as World Environment Day and the International Day to Combat Desertification, thereby linking local issues to global environmental agendas.

The effectiveness of radio as a communication tool lies in its ability to reach a broad audience, including individuals with limited literacy. This aligns with research indicating that traditional media continue to play a vital role in environmental communication, particularly in developing contexts (Moser, 2016).

Television

Television serves as another important audiovisual medium used by the Forestry Directorate to communicate environmental information. It provides visual coverage of environmental issues, institutional activities, and sectoral developments, thereby enhancing public awareness and engagement.

The visual dimension of television communication allows for the effective representation of environmental problems, making them more tangible and relatable to the audience. This is particularly important in the context of environmental risks, where visual evidence can significantly influence perception and behavior (Cox, 2013).

Analysis of Interview Results

First Axis: Communication Mechanisms Used in Combating Environmental Problems

Adopted Communication Methods

The findings from the structured interview reveal that the Forestry Directorate employs a combination of traditional and modern communication methods to address environmental challenges.

Modern Communication (Social Media)

The Directorate actively utilizes its official Facebook page as a digital communication platform, through which it disseminates information, reports on activities, and organizes awareness campaigns.

Social media platforms are increasingly recognized as powerful tools for environmental communication due to their wide reach, interactivity, and real-time information sharing capabilities (Kaplan & Haenlein, 2010). In this context, Facebook serves not only as an information channel but also as a participatory space where citizens can engage with environmental initiatives.

Radio Communication

Radio remains a key communication tool for addressing diverse segments of society. The Forestry Directorate leverages local radio stations to broadcast programs focused on environmental issues, particularly during significant environmental events.

This approach ensures that environmental messages reach a wide audience, including those who may not have access to digital platforms.

Direct Communication (Educational Outreach)

Direct engagement through schools, universities, and associations represents another important communication mechanism. The Directorate organizes seminars, workshops, and awareness sessions aimed at educating young people and fostering environmental responsibility.

Such initiatives contribute to the development of long-term environmental awareness and behavioral change, particularly among younger generations (Jacobson et al., 2015).

Printed Materials (Brochures)

The continued use of brochures demonstrates the importance of combining traditional and modern communication tools. By presenting information in a structured and visually engaging manner, brochures enhance comprehension and retention of environmental messages.

Role of Communication Methods

The interview findings indicate that communication methods play a significant and multidimensional role in addressing environmental problems. Each communication tool targets specific audience groups, thereby ensuring broader coverage and effectiveness.

These methods contribute to:

- Raising environmental awareness
- Promoting sustainable behaviors
- Strengthening community participation
- Supporting policy implementation

This aligns with existing literature, which emphasizes the role of communication in bridging the gap between environmental knowledge and action (Lee et al., 2015).

Effectiveness of Social Media

The interview results highlight the growing importance of social media as a highly effective communication tool. According to the respondent, social media platforms—particularly Facebook—are among the most efficient means of addressing environmental problems due to their accessibility and widespread use .

The Forestry Directorate uses social media to:

- نشر المعلومات البيئية disseminate environmental information
- دعوة المواطنين للمشاركة invite citizens to participate in environmental campaigns
- تعزيز العمل التطوعي promote volunteer activities such as tree planting and cleaning campaigns

From a theoretical perspective, this reflects the shift toward digital environmental communication, which enables interactive engagement and collective action (Ockwell et al., 2009; Moser, 2016).

Table 1. Communication Mechanisms Used by the Forestry Department of Ghardaia Province

Communication Mechanism	Type	Target Audience	Key Objectives	Practical Implementation	Expected Impact
Meetings	Internal / External	Staff, local authorities, stakeholders	Coordination, decision-making, problem-solving	Regular coordination meetings between departments and external partners	Improved institutional efficiency and collaborative environmental governance
Brochures	Traditional / Print	General public, rural communities	Awareness raising, behavioral guidance	Distribution during campaigns, open days, environmental events	Increased environmental awareness and preventive behavior
Field Visits	Direct / Participatory	Local communities, farmers, citizens	Education, engagement, trust-building	On-site awareness campaigns, joint interventions with authorities	Enhanced community participation and localized environmental solutions
Radio Broadcasting	Mass Media	General population (including illiterate groups)	Information dissemination, awareness	Environmental programs during international environmental days	Broad outreach and inclusive communication
Television	Audiovisual Media	National and regional audiences	Public awareness, visibility of environmental issues	Coverage of environmental problems and forestry activities	Strong visual impact and increased public attention
Social Media (Facebook)	Digital / Interactive	Youth, urban population, general public	Engagement, mobilization, real-time communication	Posting news, campaigns, volunteer invitations	High interaction, rapid information dissemination, behavioral influence

Educational Outreach (Schools & Universities)	Direct / Educational	Students, youth	Long-term awareness, environmental education	Workshops, seminars, awareness sessions	Development of environmental culture and sustainability mindset

Table 2. Functional Role and Effectiveness of Communication Mechanisms in Combating Environmental Problems

Environmental Problem	Communication Mechanisms Used	Type of Intervention	Observed Outcomes	Effectiveness Level	Supporting Literature
Forest Fires	Brochures, field visits, radio, social media	Preventive awareness and emergency response	Increased public awareness, faster response, reduced damage	High	Moser (2016); Ockwell et al. (2009)
Desertification	Radio programs, awareness campaigns, meetings	Educational and policy communication	Improved understanding of environmental risks	Moderate–High	Reed (2008); Berkes (2009)
Soil Erosion	Field visits, educational outreach	Community engagement and training	Adoption of preventive practices	Moderate	Pretty (2003)
Illegal Hunting	Radio, social media, direct communication	Awareness and behavioral regulation	Reduction in illegal activities (reported cases)	Moderate	Cox (2013)
Environmental Pollution	Media campaigns, workshops, brochures	Information dissemination and sensitization	Increased environmental responsibility	Moderate–High	Lee et al. (2015)
General Environmental Awareness	All mechanisms combined	Integrated communication strategy	Strengthened environmental culture	High	Jacobson et al. (2015)

4. Findings and Discussion

4.1. Overview of Key Findings

The empirical findings of this study reveal that the Forestry Department of Ghardaia Province employs a multi-layered and hybrid communication system that integrates traditional, interpersonal, and digital communication mechanisms. These include meetings, field visits, brochures, radio and television broadcasting, educational outreach, and social media platforms such as Facebook.

The results indicate that communication is not treated as a secondary administrative function but rather as a core operational strategy for addressing environmental challenges. This aligns with contemporary environmental governance frameworks, which emphasize the centrality of communication in promoting awareness, facilitating coordination, and influencing behavior (Cox, 2013; Moser, 2016).

Furthermore, the findings demonstrate that different communication tools are strategically deployed to target specific audience groups, thereby enhancing the overall effectiveness of environmental interventions. This targeted approach reflects an implicit understanding of audience segmentation, a key principle in modern communication theory.

4.2. Effectiveness of Communication Mechanisms

4.2.1. Integrated Communication Approach

One of the most significant findings of this study is the adoption of an integrated communication model, combining multiple channels to maximize outreach and impact. As shown in Table 1 and Table 2, the Forestry Department does not rely on a single communication tool but instead employs a diversified strategy that includes both traditional and modern methods.

This approach is consistent with the literature on environmental communication, which highlights the importance of using multiple channels to address the complexity of environmental issues and reach heterogeneous audiences (Ockwell et al., 2009).

For instance, while brochures and field visits are effective in rural and local contexts, social media platforms provide broader and more immediate outreach, particularly among younger and urban populations.

4.2.2. Role of Direct and Participatory Communication

The findings emphasize the critical role of direct communication mechanisms, particularly field visits and educational outreach programs. These methods enable face-to-face interaction, fostering trust, engagement, and mutual understanding between the institution and the community.

Field visits, in particular, were found to be highly effective in raising awareness and promoting behavioral change, as they allow for contextualized communication and immediate feedback from stakeholders.

This observation supports participatory communication theories, which argue that sustainable environmental outcomes depend on active community involvement and dialogue rather than top-down information dissemination (Reed, 2008; Pretty, 2003).

Moreover, the coordination observed between the Forestry Department and other institutions—such as civil protection units and local authorities—demonstrates the importance of multi-stakeholder collaboration in addressing environmental risks, particularly in emergency situations like forest fires.

4.2.3. Importance of Mass Media and Traditional Channels

Despite the rise of digital communication, the study highlights the continued relevance of traditional media, particularly radio. Radio broadcasting plays a crucial role in reaching diverse segments of the population, including individuals with limited access to digital technologies or low literacy levels.

The use of radio programs during international environmental events reflects a strategic alignment between local communication practices and global environmental agendas. This enhances both the credibility and relevance of the messages delivered.

Television, although less interactive, contributes to raising awareness through visual representation of environmental issues, thereby reinforcing the urgency and visibility of ecological challenges.

These findings are consistent with previous studies indicating that traditional media remain essential components of environmental communication strategies in developing regions (Moser, 2016).

4.2.4. Emergence of Digital Communication

A notable finding of this study is the increasing reliance on social media platforms, particularly Facebook, as a primary communication tool. The Forestry Department utilizes its official page to disseminate information, promote campaigns, and encourage public participation in environmental activities.

Social media offers several advantages, including rapid information dissemination, interactivity, and the ability to mobilize communities. The findings suggest that digital communication is perceived by institutional actors as one of the most effective tools for addressing environmental problems.

This aligns with contemporary research, which highlights the transformative potential of digital platforms in enhancing public engagement and facilitating collective environmental action (Kaplan & Haenlein, 2010; Ockwell et al., 2009).

However, the effectiveness of digital communication is contingent upon access, digital literacy, and sustained engagement, which may vary across different segments of the population.

4.3. Communication Mechanisms and Environmental Outcomes

The analysis reveals a strong relationship between communication mechanisms and the effectiveness of environmental interventions. Each environmental problem—such as forest fires, desertification, and illegal hunting—is addressed through a combination of communication tools tailored to the specific context.

For example:

- Forest fires are addressed through brochures, field visits, and media campaigns, resulting in increased awareness and improved response times.
- Desertification is tackled through awareness programs and radio broadcasts, contributing to a better understanding of environmental risks.
- Illegal hunting is addressed through targeted communication campaigns, leading to increased compliance with regulations.

These findings demonstrate that communication mechanisms function as enabling tools that support policy implementation, enhance public awareness, and influence behavior.

This supports the broader theoretical argument that communication plays a mediating role between environmental knowledge and action, helping to bridge the well-documented "awareness–behavior gap" (Lee et al., 2015).

4.4. Challenges and Limitations

Despite the overall effectiveness of communication mechanisms, the study identifies several challenges that may limit their impact:

- Limited integration of advanced digital technologies
- Dependence on traditional communication methods in certain contexts
- Potential gaps in reaching remote or marginalized populations
- Resource constraints affecting the scale and frequency of communication activities

These challenges are consistent with findings from previous studies on environmental governance in developing countries, which highlight structural and institutional limitations as key barriers to effective communication (Reddy & Behera, 2006).

4.5. Theoretical and Practical Implications

From a theoretical perspective, the findings contribute to the growing body of literature on environmental communication by providing empirical evidence from a local institutional context. The study demonstrates the relevance of integrated and participatory communication models in addressing environmental challenges.

From a practical standpoint, the results highlight the need for:

- Strengthening digital communication strategies
- Enhancing community participation and engagement
- Expanding multi-stakeholder collaboration
- Developing context-specific communication approaches

These implications are particularly relevant for policymakers and practitioners seeking to improve environmental governance and sustainability outcomes.

4.6. Synthesis of Findings

Overall, the study confirms that communication mechanisms play a critical and multidimensional role in combating environmental problems. The effectiveness of these mechanisms depends on their diversity, adaptability, and alignment with the socio-cultural context of the target audience.

The Forestry Department of Ghardaia Province demonstrates a relatively strong capacity in utilizing communication as a strategic tool. However, further improvements—particularly in digital transformation and participatory engagement—are necessary to enhance its effectiveness and sustainability.

Second Axis: Activities of the Forestry Department in Combating Environmental Problems

Impact of Environmental Activities on Public Behavior

The findings indicate that environmental activities implemented by the Forestry Department exert a moderate yet progressively increasing influence on public behavior. These activities are primarily designed to instill environmental values, promote responsible attitudes, and encourage proactive engagement in environmental protection.

According to the interview results, awareness campaigns, educational programs, and community-based initiatives contribute to the gradual development of an environmentally conscious society. These interventions aim to cultivate a sense of responsibility, initiative, and long-term commitment toward environmental preservation .

From a theoretical perspective, this finding aligns with behavioral change models, which suggest that environmental awareness evolves incrementally through continuous exposure to information and social reinforcement (Lee et al., 2015). The transformation of attitudes into sustained behavioral practices requires repeated communication efforts and the internalization of environmental values.

However, the impact of such activities remains partial and time-dependent, indicating the presence of an "awareness–action gap," where increased knowledge does not always translate into immediate behavioral change.

Role of Citizen Participation

Citizen participation emerges as a critical determinant in the effectiveness of environmental communication and intervention strategies. The study confirms that active public involvement in environmental activities significantly contributes to reducing environmentally harmful behaviors.

The interview findings emphasize that human activity is a primary driver of many environmental problems; therefore, increasing public awareness and participation directly contributes to mitigating these issues .

Nevertheless, the study also reveals that participation levels remain moderate, particularly during environmental events, exhibitions, and campaigns. This limitation is largely attributed to insufficient environmental awareness and limited engagement among certain segments of the population.

This observation is consistent with participatory governance literature, which highlights that effective environmental management requires not only institutional action but also strong community involvement and social mobilization (Reed, 2008; Pretty, 2003).

Citizen–Institution Interaction

The study further identifies an emerging pattern of citizen-initiated communication, as evidenced by reports from individuals regarding environmental violations, such as the destruction of state-protected reserves.

This indicates a growing level of environmental awareness and trust in institutional mechanisms, reflecting the role of communication in fostering a sense of shared responsibility between citizens and public authorities.

Such interactions are essential for enhancing environmental monitoring and enforcement, particularly in regions where institutional capacity may be limited.

Third Axis: Environmental Challenges and Institutional Collaboration

Major Environmental Problems in Ghardaia Province

The findings identify several key environmental challenges affecting the Ghardaia region, including:

- Desertification
- Soil erosion
- Environmental pollution
- Indiscriminate (illegal) hunting

These problems are characteristic of arid and semi-arid environments, where ecological systems are particularly vulnerable to both natural and anthropogenic pressures.

The prevalence of these issues underscores the need for integrated environmental management strategies that combine regulatory measures with effective communication and community engagement (Reddy & Behera, 2006).

Role of Environmental Associations

The study highlights the importance of collaborative partnerships between the Forestry Department and civil society organizations in addressing environmental challenges.

Cooperation with environmental associations contributes to:

- Reforestation and anti-desertification initiatives
- Awareness-raising campaigns
- Promotion of environmental culture and citizenship values

The identified associations—including community-based organizations, youth groups, and environmental NGOs—play a complementary role in extending the reach and impact of institutional communication efforts .

This finding aligns with co-management and collaborative governance theories, which emphasize the importance of multi-stakeholder engagement in achieving sustainable environmental outcomes (Berkes, 2009; Armitage et al., 2007).

Fourth Axis: Obstacles Facing the Forestry Department

Key Challenges

Despite the efforts of the Forestry Department, several structural and social challenges limit the effectiveness of environmental interventions. The most significant obstacles identified include:

- Low level of environmental awareness among the population
- Insufficient material and financial resources
- Limited human capacity and institutional support

- Difficulty in engaging citizens due to lack of interest or awareness

These challenges reflect broader issues commonly observed in environmental governance within developing contexts, where institutional capacity constraints and socio-cultural factors hinder the implementation of effective policies (Moser, 2016).

Implications of Identified Obstacles

The lack of environmental awareness represents the most critical barrier, as it directly affects public participation and compliance with environmental regulations.

Similarly, resource limitations restrict the ability of the Forestry Department to expand its communication activities and implement large-scale environmental programs.

These findings suggest that improving environmental outcomes requires not only strengthening institutional capacity but also enhancing communication strategies to address socio-cultural barriers.

Policy Recommendations

Based on the findings, several key policy directions are proposed to enhance the effectiveness of environmental communication within the Forestry Department of Ghardaia Province.

First, it is essential to strengthen digital communication strategies, particularly through social media and multimedia tools, to improve public outreach and engagement (Moser, 2016).

Second, increasing community participation through volunteer programs, awareness campaigns, and partnerships with civil society organizations is crucial for fostering environmental responsibility and reducing harmful practices (Reed, 2008).

Third, the integration of environmental education into schools and public programs should be prioritized to promote long-term behavioral change and sustainability awareness (Jacobson et al., 2015).

Fourth, enhancing institutional capacity and resources, including staff training and technological support, is necessary to improve communication efficiency and program implementation.

Finally, it is recommended to develop an integrated environmental communication policy that aligns institutional efforts with national environmental strategies and ensures coordination among stakeholders.

Conclusion

This study aimed to analyze the communication mechanisms employed by the Forestry Department of Ghardaia Province in combating environmental problems, with a particular focus on their effectiveness in promoting awareness and influencing behavior.

The findings confirm that the Forestry Department plays a central and strategic role in environmental protection, not only through regulatory functions but also through communication-based interventions aimed at educating the public and fostering behavioral change.

Environmental problems in the region—such as desertification, pollution, and illegal hunting—pose significant threats to ecological sustainability and human well-being. In response, the Forestry Department has implemented a range of communication mechanisms, including field visits, awareness campaigns, brochures, and digital platforms, which have demonstrated varying degrees of effectiveness.

However, the study also highlights several limitations, particularly in terms of public awareness, participation, and resource availability. These challenges underscore the need for a more integrated and strategic approach to environmental communication, combining traditional methods with digital innovation and participatory engagement.

Ultimately, the study emphasizes that environmental protection is a shared responsibility, requiring the coordinated efforts of governmental institutions, civil society, and citizens. Strengthening communication mechanisms, enhancing public awareness, and fostering community participation are essential for achieving sustainable environmental outcomes.

The Forestry Department's experience demonstrates that while progress has been made, further efforts are needed to develop a fully informed and environmentally responsible society capable of addressing the complex challenges of environmental degradation.

Ethical Approval and Consent to Participate

This study does not involve human subjects in a clinical or experimental context. All data were collected in accordance with standard ethical guidelines for social science research. Participation in interviews was voluntary, and informed consent was obtained from the respondent prior to data collection.

Consent for Publication

The author confirms that the manuscript has not been published previously and is not under consideration for publication elsewhere. All participants involved in the study have provided their consent for the use of anonymized data for academic publication purposes.

Availability of Data and Materials

The data supporting the findings of this study are available from the corresponding author upon reasonable request. Due to the nature of the research, some data (e.g., interview transcripts) may be subject to confidentiality restrictions.

Competing Interests

The author declares that there are no competing financial, professional, or personal interests that could have influenced the work reported in this paper.

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Author Contributions

Dr. Neche Azouz is the sole author of this study and was responsible for the conceptualization, methodology design, data collection, analysis, interpretation of results, and manuscript preparation.

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Research Limitations

This study is limited to a single institutional case within Ghardaia Province, which may affect the generalizability of the findings. Additionally, the reliance on qualitative data and a limited number of interview participants may restrict the scope of empirical analysis. Future research is encouraged to adopt comparative and quantitative approaches to validate and expand upon these findings.

Data Availability Statement

All relevant data generated or analyzed during this study are included in this published article. Additional information can be provided by the author upon reasonable request.

Conflict of Interest Statement

The author declares no conflict of interest regarding the publication of this paper.

AI Use Statement

The author declares that artificial intelligence tools were used only for language editing and formatting purposes. All intellectual content, analysis, and conclusions are the original work of the author.

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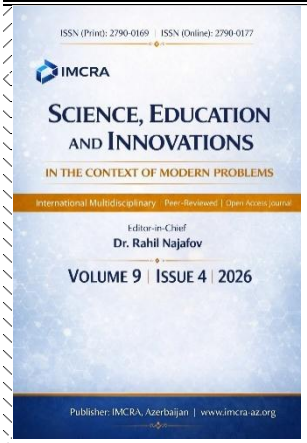
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RESEARCH ARTICLE

Ecotourism as a Catalyst for Sustainable Island Development: Evidence from Yakushima Island, Japan

Yassine Mostefai
Dr.
University of Setif 1, LEMAC Laboratory
Algeria
E-mail: yassine.mostefai@univ-setif.dz; https://orcid.org/0009-0006-0296-303X

Farouk Sahnoune
Professor
University of Setif 1, LEMAC Laboratory
Algeria
E-mail: farouk.sahnoune@univ-setif.dz; https://orcid.org/0009-0007-0437-5204

Keywords Ecotourism; Sustainable development; Yakushima Island; Japan; Community participation; Tourism governance

Abstract

This study critically examines the current state and developmental trajectory of ecotourism on Yakushima Island, Japan, positioning it as a benchmark model for sustainable tourism in island ecosystems. Adopting a qualitative case study approach based on secondary data analysis, the research explores the dynamic interaction between environmental conservation, institutional frameworks, and community participation in shaping ecotourism outcomes. The findings indicate that the emergence of ecotourism in Yakushima since the 1990s—driven significantly by in-migrant eco-guides—has contributed to local economic revitalization through job creation and diversification of tourism services. Despite fluctuations in visitor numbers, particularly a decline after 2008, the gradual increase in international tourism has supported the resilience and adaptive capacity of the island's tourism sector. The study further highlights the critical role of national policy instruments, notably the Ecotourism Promotion Act (2007), and the establishment of governance structures that coordinate sustainable tourism practices. In addition, the integration of local communities and eco-guides is identified as a key mechanism for balancing environmental protection with socio-economic benefits. Theoretically, the paper contributes to the discourse on sustainable tourism by demonstrating how the synergy between natural capital, policy intervention, and stakeholder engagement can foster an inclusive and environmentally responsible development model. Practically, the Yakushima experience provides transferable insights for policymakers and practitioners seeking to implement ecotourism strategies in similar ecological and socio-economic contexts.

Jel Classification Codes: Q5, Q56, Z32

Citation

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1. Introduction

Tourism has increasingly been recognized as a strategic sector for economic development, particularly in regions endowed with rich natural and cultural resources. Beyond its direct contribution to employment generation and income

diversification, tourism plays a critical role in fostering regional development and socio-economic transformation. In recent decades, the global tourism industry has accounted for approximately 10% of global GDP, underscoring its significance as a driver of economic growth and development (Muhammad, 2022). However, the rapid expansion of tourism activities has also raised concerns regarding environmental degradation, cultural commodification, and the unsustainable exploitation of natural resources (Das & Chatterjee, 2015).

In response to these challenges, the concept of sustainable tourism has emerged as a guiding framework aimed at balancing economic development with environmental conservation and social equity. Within this framework, Ecotourism has gained prominence as an alternative model that integrates environmental protection, community participation, and economic sustainability. Ecotourism is commonly defined as responsible travel to natural areas that conserves the environment and improves the well-being of local populations (Fennell, 1999). Subsequent studies have expanded this definition to emphasize its multidimensional character, incorporating governance structures, environmental education, and stakeholder collaboration as essential components of sustainable tourism systems (Buckley, 2009; Weaver, 2001).

A substantial body of literature highlights the role of ecotourism as a catalyst for local economic development and community empowerment. For instance, Scheyvens (1999) argues that ecotourism can enhance the socio-economic conditions of local communities by creating employment opportunities and promoting participatory development. Similarly, Stronza et al. (2019) demonstrate that ecotourism can contribute to biodiversity conservation while simultaneously generating economic benefits, particularly in rural and peripheral regions. Nevertheless, these outcomes are not guaranteed and depend heavily on effective governance, institutional capacity, and the equitable distribution of benefits among stakeholders (Higham, 2007).

The environmental dimension of ecotourism has also been widely discussed, particularly in the context of fragile ecosystems such as islands. Island environments are characterized by limited resources, ecological vulnerability, and spatial constraints, which make them highly sensitive to tourism-related pressures (d'Hauteserre & Funck, 2016). As a result, the development of ecotourism in such contexts requires careful management to avoid negative impacts such as over-tourism, habitat degradation, and biodiversity loss (Buckley, 2009). At the same time, island ecotourism presents unique opportunities for integrating conservation efforts with local development strategies, thereby contributing to sustainable livelihoods (Lee & Jan, 2019).

Within this global context, Japan has emerged as a notable example of a country that has successfully integrated ecotourism into its national development strategy. The introduction of the *Ecotourism Promotion Act (2007)* marked a significant policy milestone, providing a structured framework for the development and regulation of ecotourism activities. This policy emphasizes the importance of environmental conservation, cultural preservation, and community participation, while also promoting innovation and diversification within the tourism sector (Yamada, 2011). Governmental initiatives, combined with local institutional arrangements such as ecotourism councils, have contributed to the establishment of a coordinated and sustainable tourism system.

Among the various ecotourism destinations in Japan, Yakushima Island represents a particularly compelling case. Designated as a UNESCO World Natural Heritage Site in 1993, the island is renowned for its unique biodiversity, ancient cedar forests, and diverse climatic conditions. The development of ecotourism on Yakushima since the 1990s—driven in part by in-migrant eco-guides—has transformed the island into a leading model of sustainable tourism in island environments (Adewumi & Funck, 2016; Usui et al., 2021). The interaction between natural capital, policy frameworks, and community engagement has played a central role in shaping the island's ecotourism trajectory.

Despite the growing body of research on ecotourism, several gaps remain in the literature. In particular, there is a need for integrated analyses that examine the interplay between environmental, economic, and governance dimensions within specific case study contexts. Moreover, limited attention has been paid to the long-term sustainability and transferability of ecotourism models across different socio-economic and ecological settings.

In light of these gaps, this study aims to analyze the current state and development of ecotourism on Yakushima Island, Japan, with a particular focus on its role as a catalyst for sustainable island development. The study seeks to address the following research question:

What is the current state of ecotourism on Yakushima Island, and how does it contribute to sustainable local development?

By adopting a qualitative case study approach, this research contributes to the existing literature by providing a comprehensive and integrated analysis of ecotourism as a multidimensional development mechanism, highlighting the interconnections between policy, community participation, and environmental sustainability.

Methodology

This study adopts a qualitative case study approach to examine the development and current state of ecotourism on Yakushima Island, Japan, as a model of sustainable tourism in island environments.

Research Design

The research is based on an exploratory and descriptive analytical design, aiming to understand the interaction between environmental conservation, public policy, and community participation in shaping ecotourism outcomes. Yakushima Island was selected as a representative case study due to its status as a UNESCO World Natural Heritage Site and its recognized success in implementing ecotourism strategies.

Data Collection

The study relies exclusively on secondary data sources, including:

- Academic journal articles and conference proceedings;
- Reports from international organizations and tourism institutions;
- Government publications, particularly from the Ministry of the Environment of Japan;
- Official statistical data and previously published case studies on Yakushima Island.

This approach ensures a comprehensive understanding of the evolution of ecotourism policies and practices in the selected context.

Analytical Framework

The analysis is guided by a thematic content analysis method, focusing on key dimensions of ecotourism, including:

- Environmental sustainability;
- Economic contribution to local communities;
- Governance and policy frameworks;
- Stakeholder engagement and community participation.

Additionally, the study incorporates a comparative interpretative perspective, positioning Yakushima Island within the broader context of global ecotourism practices.

Limitations of the Study

This research is limited by its reliance on secondary data, which may restrict access to real-time empirical evidence. Furthermore, the study focuses on a single case, which may limit the generalizability of the findings. However, the depth of analysis provides valuable insights applicable to similar island ecosystems and developing ecotourism contexts.

Literature Review

The concept of ecotourism has evolved significantly over the past decades, emerging as a key instrument for achieving sustainable development by integrating environmental conservation, socio-economic benefits, and cultural preservation. Early foundational studies conceptualized ecotourism as responsible travel to natural areas that conserves the environment and improves the well-being of local populations (Fennell, 1999). Subsequent research has expanded this definition to emphasize its multidimensional nature, incorporating governance, community participation, and environmental education as essential pillars of sustainable tourism systems.

A central theme in the literature concerns the role of ecotourism as a driver of local economic development. Studies such as Ecotourism for Conservation by Stronza et al. (2019) highlight that ecotourism can generate employment opportunities, diversify local economies, and reduce dependence on extractive industries. Similarly, Scheyvens (1999) argues that ecotourism contributes to the empowerment of local communities, particularly when residents are actively involved in tourism planning and benefit-sharing mechanisms. However, the literature also acknowledges that these benefits are not automatic and depend heavily on governance structures and stakeholder collaboration.

Another major strand of research focuses on the environmental dimension of ecotourism. Buckley (2009) and Weaver (2001) emphasize that ecotourism must operate within ecological limits to avoid environmental degradation, particularly in fragile ecosystems such as islands. In this context, the balance between conservation and tourism development remains a critical challenge. Das and Chatterjee (2015) further argue that ecotourism may become a "predicament" rather than a solution if it leads to over-tourism, habitat destruction, or commercialization of natural resources without adequate regulatory frameworks.

The role of policy and governance has also been widely examined. Higham (2007) notes that successful ecotourism development requires strong institutional frameworks that integrate environmental protection with economic planning. In the case of Japan, the introduction of the *Ecotourism Promotion Act (2007)* represents a significant policy innovation aimed at regulating and promoting sustainable tourism practices. Governmental initiatives, combined with local governance structures such as ecotourism councils, have been identified as key drivers in ensuring long-term sustainability (Yamada, 2011).

A growing body of literature highlights the importance of community-based and participatory approaches in ecotourism. Lee and Jan (2019) demonstrate that the sustainability of tourism initiatives is closely linked to residents' perceptions and levels of engagement. When local communities actively participate in decision-making processes, ecotourism is more likely to achieve both environmental and socio-economic objectives. This aligns with the findings of Adewumi and Funck (2016), who show that stakeholder perceptions significantly influence the success and acceptance of ecotourism initiatives in Yakushima Island.

Island ecotourism, in particular, has received increasing attention due to its unique environmental and socio-economic characteristics. Research by d'Hauteserre and Funck (2016) emphasizes the importance of innovation and adaptability in island tourism systems, where limited resources and geographical isolation require context-specific strategies. Similarly, Usui et al. (2021) highlight the role of tourism in shaping demographic and economic transformations in peripheral island regions, including processes such as counter-urbanization and migration.

Within the Japanese context, Yakushima Island is frequently cited as a model case of ecotourism development. Studies indicate that the island's success is closely linked to the interaction between natural assets, policy frameworks, and community engagement. The designation of Yakushima as a UNESCO World Natural Heritage Site has significantly enhanced its global visibility and attractiveness, while also imposing stricter conservation requirements (Seo & Kim, 2016). Furthermore, the emergence of eco-guides—many of whom are in-migrants—has played a crucial role in shaping the local ecotourism industry, contributing to both environmental awareness and economic diversification (Adewumi & Funck, 2016).

Despite these positive developments, the literature also identifies several challenges and gaps. These include the risk of environmental degradation due to increased tourist flows, conflicts among stakeholders regarding resource management, and the lack of standardized frameworks for evaluating the effectiveness of ecotourism initiatives. Additionally, there is a notable gap in empirical research focusing on the long-term impacts of ecotourism on island ecosystems and local communities.

In summary, the existing literature demonstrates that ecotourism is a complex and dynamic phenomenon that requires a careful balance between environmental sustainability, economic development, and social inclusion. While numerous studies have explored individual aspects of ecotourism, there remains a need for integrated analyses that examine the interplay between these dimensions within specific case study contexts. This study addresses this gap by providing a comprehensive analysis of Yakushima Island as a model of ecotourism development, with particular emphasis on the interaction between policy, community participation, and environmental conservation.

Previous studies

have explored the dynamics of ecotourism and sustainability in Yakushima Island, Japan, emphasizing both environmental and socio-economic dimensions. Arika Kuroiwa and Keiichiro Kanemoto (2016) analyzed the sustainability of Yakushima as a World Natural Heritage Site, highlighting its mountainous terrain, limited arable land, and significant demographic challenges, including population decline and rapid aging, which affect local development and tourism sustainability.

Focusing on stakeholder perspectives, Ifeoluwa Bolanle Adewumi and Carolin Funck (2017) examined the perceptions of tourism business operators using a questionnaire-based approach. Their findings indicate that ecotourism has contributed positively to the local economy and community development, while also generating environmental concerns such as resource overuse, waste accumulation, and trail degradation. The study also revealed that perceptions differ significantly depending on stakeholders' origin, type of business, and time of establishment.

In a subsequent study, Ifeoluwa Bolanle Adewumi, Rie Usui, and Carolin Funck (2019) investigated environmental issues from a multi-stakeholder perspective using mixed methods. The results showed that increasing tourist numbers and the controversial management of deer populations are key environmental challenges. Divergent stakeholder perceptions, particularly regarding wildlife management, add complexity to achieving sustainable tourism development.

Additionally, Anne-Marie d'Hauteserre (2016) emphasized the importance of innovation in island ecotourism. By comparing Yakushima with other island destinations, the study highlighted the need for creative strategies and sustainable approaches to enhance attractiveness and competitiveness, while acknowledging the complexity of implementation.

Definition of Ecotourism

Many researchers have differed in defining "ecotourism," yet most agree that the sustainable use of on-site resources constitutes one of its fundamental pillars. Ecotourism encompasses a wide range of resources, including natural and cultural elements, as well as festivals and events, aiming to achieve sustainable development from both environmental and social perspectives (Naoko, 2011, p. 139).

In general, ecotourism is defined as: "A sustainable form of tourism based on natural resources, primarily focused on experiencing and learning about nature. It is managed in a rational manner to be low-impact, non-consumptive, and locally

oriented. It typically takes place in natural areas and is expected to contribute to their conservation or protection" (David, 1999, p. 43).

Ecotourism is also defined as: "Responsible travel to natural areas that conserves the environment, supports the well-being of local people, and fosters knowledge and understanding through interpretation and education among all stakeholders (visitors, staff, and local communities)" (Network, 2016).

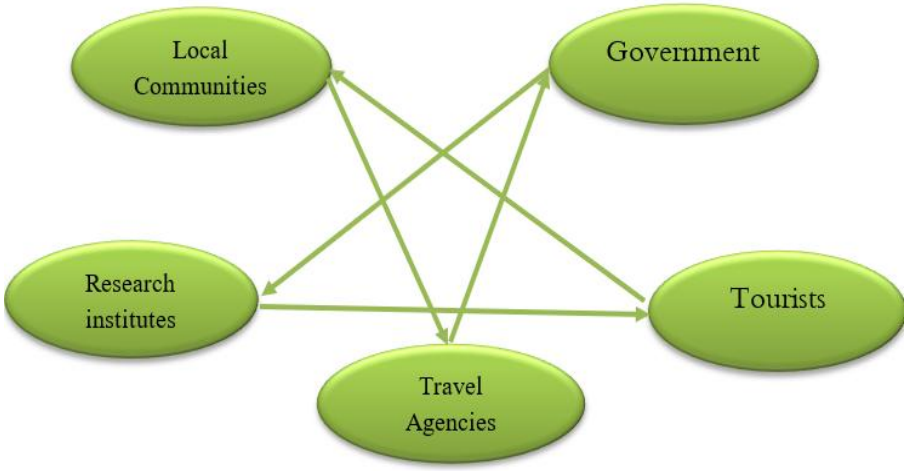
In the same context, the International Ecotourism Society (TIES) defines ecotourism as: "Responsible travel to natural areas that conserves the environment and improves the well-being of local people" (Hassiba, 2022, p. 27). The Society also emphasizes that ecotourism aims to link conservation efforts, community empowerment, and sustainable travel. This implies that individuals and entities involved in ecotourism activities should adhere to the following core principles (Belkidoum & Mamen, 2016, p. 730):

- Minimizing environmental impact as much as possible;
- Promoting environmental and cultural awareness and fostering mutual respect;
- Providing positive experiences for both visitors and host communities;
- Generating direct financial benefits to support conservation efforts;
- Ensuring economic returns and real empowerment for local populations;
- Raising awareness of the political, environmental, and social contexts of host countries.

From the above definitions, it can be concluded that ecotourism is a form of tourism that aims to effectively promote environmental awareness while maintaining a balanced relationship among visitors, local communities, travel agencies, academics, and governments. Therefore, tourism plans should be based on the optimal use of attractive tourism resources. For this purpose, the presence of intermediaries (tour guides) with strong interpretive skills is recommended, enabling them to effectively connect nature, local culture, and visitors in a meaningful and informed way.

Maita and Kaizo further point out that ecotourism requires cooperation among various stakeholders, which is often illustrated through a five-part model (the "ecotourism pentagon"). These five actors interact in an integrated manner to ensure the successful implementation of ecotourism activities.

Figure (1): Stakeholders involved in ecotourism



Source: (Baiquni & Wiyatasari, 2023, p. 86)

The figure above refers to a conceptual model that highlights the importance of cooperation among five key stakeholders to ensure the success and sustainable development of ecotourism. These stakeholders typically include (Baiquni & Wiyatasari, 2023, p. 86):

• Government: through policies, legislation, and financial and regulatory support.

• Local communities: as the main partner and primary beneficiaries, including their economic and cultural empowerment.

• Private sector: such as tourism companies and tour operators, which provide products and services.

• Non-governmental organizations (NGOs): which contribute to awareness-raising, training, and environmental conservation.

• Tourists: as responsible participants who must demonstrate environmental and cultural awareness.

Objectives of Ecotourism

The relationship between tourism and the environment aims to make tourism an effective tool for environmental conservation and improvement, as tourism resources are an integral part of the environmental components of a region. From this perspective, ecotourism strives to achieve a set of fundamental objectives and roles, which can be summarized into four main dimensions:

• Cognitive Impact: raising visitors' awareness and understanding of the surrounding environment, such as nature and local culture, while promoting the idea of its preservation;

• Emotional Impact: enhancing feelings of appreciation and attachment to nature and culture, thereby encouraging their protection with care and affection;

• Ethical impact: instilling moral values and principles in dealing with the environment and local culture in line with positive behaviors;

• Volitional (behavioral) Impact: the ability to make positive decisions and adopt responsible behaviors within ecotourism.

These dimensions indicate that education is not limited to the transfer of knowledge, but also contributes to building an integrated system of awareness, attitudes, and behaviors necessary to achieve sustainable ecotourism. (Muhammad, 2022, p. 70). In addition, ecotourism has a tangible economic impact, particularly in terms of regional economic growth. It is also considered an important driver of productivity, provided that it is accompanied by strategic planning, institutional cooperation, and a balance between tourism supply and demand. (Muhammad, 2022, p. 80)

Types of Ecotourism:

Ecotourism has been classified into several types based on a set of different criteria and factors, as well as the needs and motivations of tourists. As a result, ecotourism is practiced in various forms, the most prominent of which are:

Exploratory tourism: This is considered one of the most prominent and most challenging types of ecotourism. It aims to visit uninhabited areas in order to acquire new knowledge, verify uncertain information, or complete incomplete data. The natural environment serves as a fertile field for explorers to conduct research, discover facts, and interact with natural living organisms, ecosystems, and natural laws, in addition to learning about the customs and traditions of the peoples in the targeted tourist region.

Recreational and leisure tourism: This type of tourism aims to seek the rest needed to restore an individual's psychological and physical balance, as humans need variety in their daily activities to escape routine and daily pressures. This is achieved by traveling to natural tourist destinations, away from city noise and problems, for relaxation, recreation, and rejuvenation.

Therapeutic ecotourism: This refers to traveling for medical or psychological treatment or for convalescence and recovery periods, by visiting areas characterized by natural healing properties such as mineral waters, hot springs, and mud baths, as well as benefiting from sunlight, seawater, and sand, all of which have positive effects on human health.

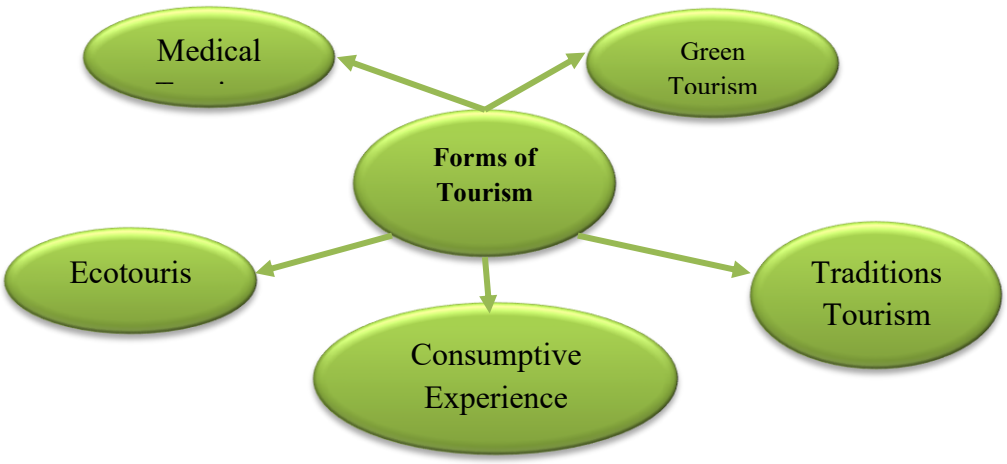
Wildlife observation tourism: In this type of tourism, tourists observe, monitor, and watch wildlife—such as birds, animals, and reptiles—in their natural habitats, with the aim of understanding their behavior, discovering their secrets, and learning how they adapt to environmental conditions. The main motivations for this type of tourism are often curiosity, enjoyment, or the desire to develop knowledge and gain scientific and environmental experience (Rashid & Sari, 2018, p. 128).

2. Ecotourism in Japan

Japan has a tourism market and industry with a modern infrastructure. Although international tourism in Japan has witnessed significant growth in the twenty-first century, driven by economic growth in neighboring Asian countries, most tourist destinations within Japan still rely primarily on domestic tourism.

The decline of the traditional domestic market—characterized by stability and dependence on organized tours and school trips—has led to the emergence of new patterns of consumer demand, along with intense competition from various international destinations. In contrast, this transformation has created space for the emergence of new forms of tourism, including:

Figure (2): Forms of Ecotourism (**Source:** (Naoko, 2011, p. 140))



The Japan Tourism Agency has classified these patterns collectively under the term "New Tourism", which focuses on the interaction between culture and the local natural environment, making it highly anticipated as an innovative tool for local economic development.

Nature enthusiasts in Japan have sought ways to earn a livelihood within natural environments by developing ecotourism tours in a distinct Japanese style. At the local level, the enactment of the Ecotourism Promotion Law has introduced a new definition of this type of tourism, incorporating cultural elements and providing the possibility of classifying and protecting tourism-related environmental resources at the local level. Non-governmental organizations (NGOs) and other civil society organizations have also played an important role in promoting integrated development projects and environmental conservation within the framework of ecotourism worldwide.

The content of the law and the basic concept of ecotourism in Japan include innovative elements. The Japanese concept of ecotourism has been adapted to the context of a highly urbanized country with a very advanced tourism market. Moreover, the emphasis on environmental education has created opportunities to strengthen ecotourism in areas with a long history of human–nature interaction. Similar to the "Natura 2000" program, which is the European Union's network of protected areas aimed at conserving representative natural habitats of European nature and restoring them, the Japanese model recognizes that most current natural habitats have been shaped and transformed through human–environment interaction (Dajeong & Sueo, 2016, p. 38).

Ecotourism in Japan is divided into four main types: (ADEWUMI & FUNCK, p. 187)

- Natural tourism, such as whale watching in Yakushima Island;
- Environmental tourism, such as school trips aimed at cleaning the Kamogawa River in Kyoto;
- Educational tourism, such as study tours in national parks or environmental conservation studies;
- Luxury tourism, which aims to raise funds to support conservation efforts.

2.1. Tourism in Yakushima Island

In Japan, Yakushima Island is considered the most prominent and most advanced site in the field of ecotourism. This form of tourism was introduced to Yakushima from outside the island in the 1990s, with the aim of preserving its natural environment while also enhancing the lives of local residents by reviving and deepening their historical relationship with their surrounding environment (ADEWUMI & FUNCK, 2016, p. 188).

2.1.1. Description of Yakushima Island:

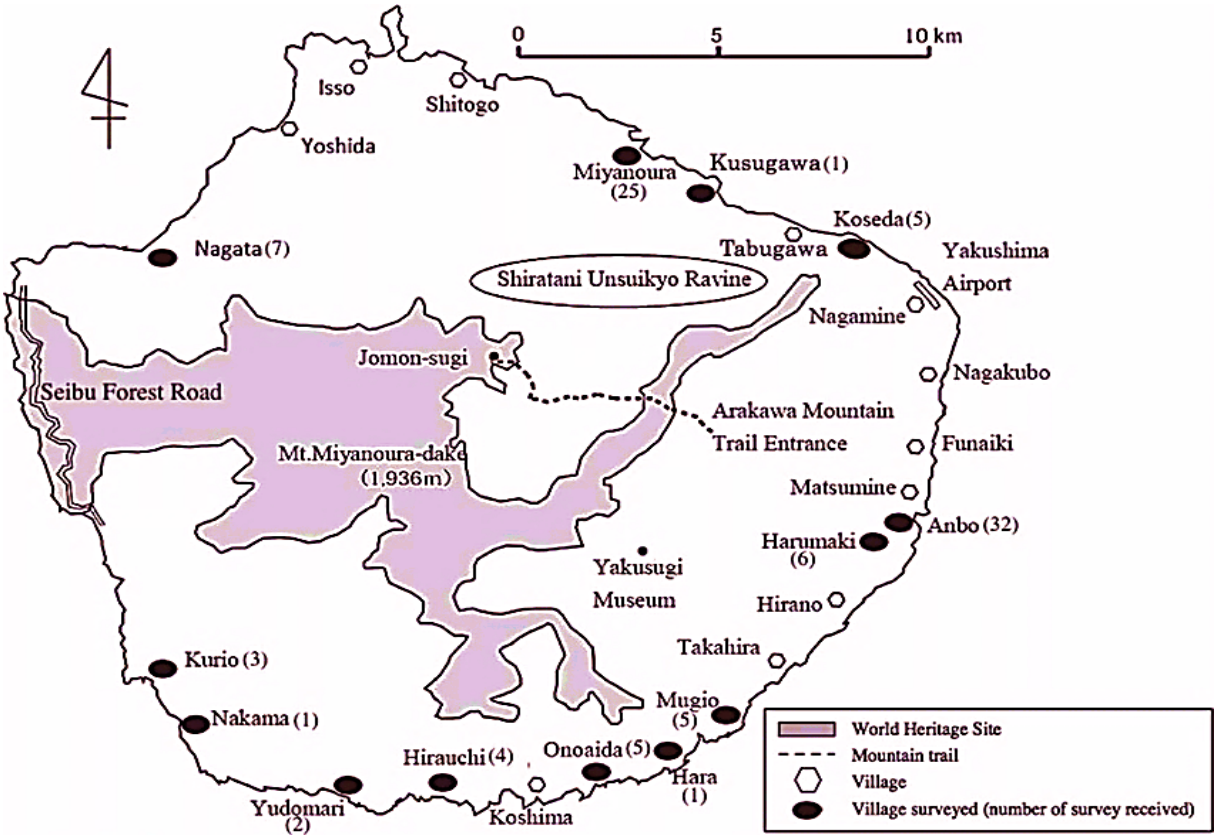
Yakushima Island is located in southern Japan, approximately 60 kilometers off the coast of Kagoshima Prefecture. It has a total area of about 500 square kilometers and lies within a geographical zone characterized by a temperate tropical climate. Due to its topographical features and isolated geographical location, the island lies within the influence of the Kuroshio Current, and therefore receives abundant annual rainfall, estimated at around 4,500 mm/year in relatively flat and dry areas, reaching 8,000–10,000 mm/year in mountainous regions.

The island also exhibits wide climatic variation, ranging from a subtropical climate in lowland areas to a subarctic climate in high-altitude regions. This climatic diversity has led to remarkable ecological development, reflected in the presence of more than 1,900 plant species and 16 confirmed endemic animal species on the island (ADEWUMI & FUNCK, 2016, p. 190). This diversity has given the island climatic characteristics representing all Japanese climatic zones extending from Hokkaido to Kyushu within a single island.

Dense forests cover approximately 90% of the island's area, about 80% of which falls within national forest zones (Dajeong & Sueo, 2016, p. 39). The island is famous for its ancient cedar trees known as "Yakusugi", which were historically regarded as religious symbols and objects of reverence. Historically, the island's inhabitants relied on these forests to meet their daily livelihood needs.

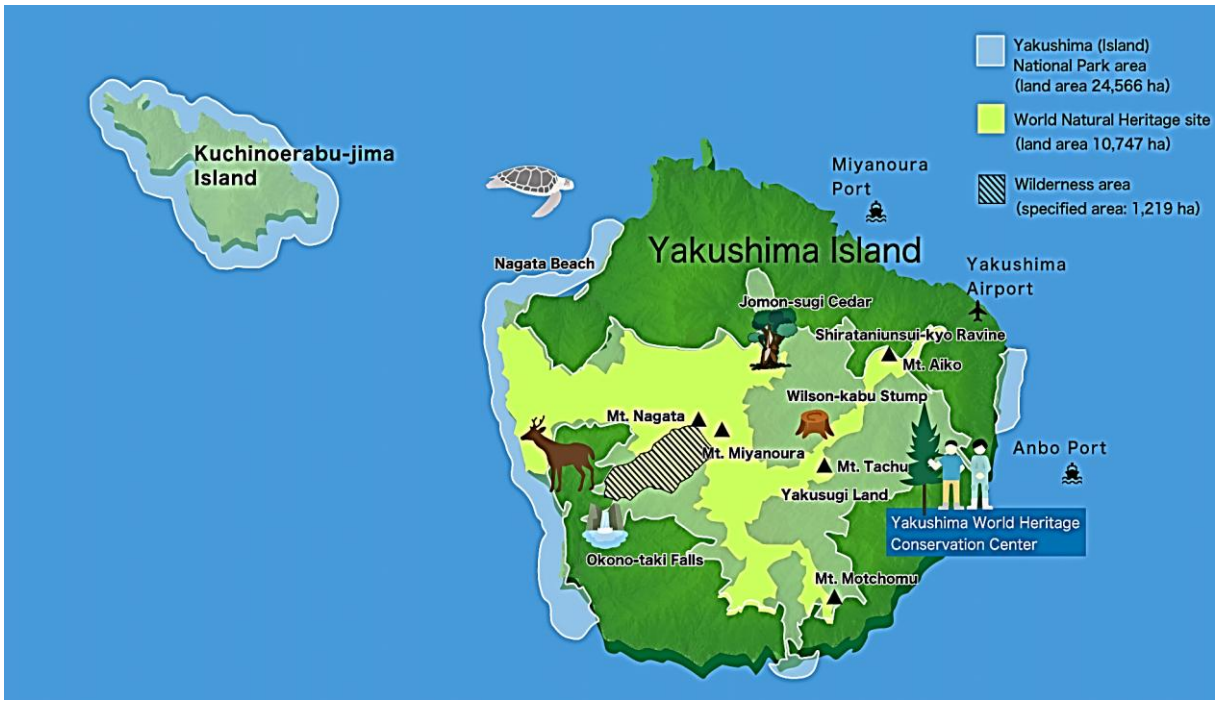
The central region of the island contains several high mountain peaks exceeding 1,800 meters, which has led to population concentration in small local communities distributed along the coast. (Rie, Carolin, & Ifeoluwa, 2021, p. 3). The following figures illustrate the geographical map of the island.

Figure (3): Geographical map of Yakushima Island



Source : (Rie, Carolin, & Ifeoluwa, 2021, p. 4)

Figure (4): Available tourist areas and services on the island



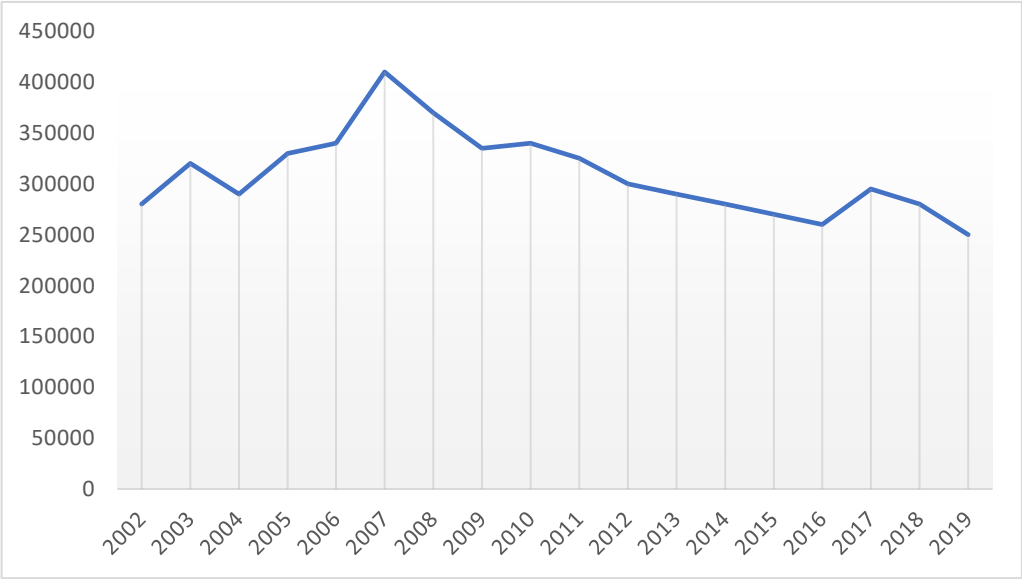
Source : (Ministry of the Environment Government of Japan, 2025)

2.1.2. Ecotourism in Yakushima Island

Kagoshima Prefecture began addressing ecotourism in Yakushima in 1992, during the development of the concept of an "Ecological Culture Village" on the island. The island was inscribed on the UNESCO World Natural Heritage List in 1993 due to its unique vegetation cover and the Yakusugi cedar trees, some of which are said to be over 2,000 years old. This designation made the island a major landmark in the field of ecotourism. In 2004, the Japanese Ministry of the Environment selected the island as a model for promoting ecotourism, which led to the establishment of the Yakushima Ecotourism Promotion Council as the governing body responsible for implementing this model project.

In the same context, the tourism industry has played an important role in the island's economy, replacing the timber industry, which was discontinued for environmental reasons. Following the designation of the island as a national park in 1964 and the launch of high-speed boat services in 1989, Yakushima began to attract an increasing number of tourists, as shown in the following figure:

Figure (5): Evolution of the number of tourists between 2019 and 2022



Source : (Rie, Carolin, & Ifeoluwa, 2021, p. 5)

It is evident that the number of tourists has been increasing, particularly after the island's inscription as a UNESCO World Natural Heritage Site. The number of tourists rose from approximately 100,000 visitors per year during the period between the 1970s and the mid-1980s (Rie, Carolin, & Ifeoluwa, 2021, p. 5), to 280,000 tourists in 2002, and then 406,000 tourists in 2007. However, this number began to decline after 2008, reaching 260,000 tourists in 2016. It rose again in 2017 before decreasing once more in 2018 and 2019.

With the increasing number of tourists, new employment opportunities began to emerge in the tourism sector, where accommodation, restaurants, tour guiding, and car rental services became the main sectors experiencing growth. In addition, several locally distinctive commercial activities also developed, such as the preparation and distribution of lunchboxes for hiking participants; equipment rental for outdoor recreational activities; production of souvenirs made from Yakusugi wood; and the production of local food products based on island resources, such as flying fish, venison, and tea.

Most tourists visiting Yakushima Island are attracted to the ancient cedar tree "Jomon Sugi," as well as two mountainous areas equipped with easy hiking trails that include other giant cedar trees and moss-covered forests. Hiking is the main tourist activity on the island; however, marine activities are also offered, such as:

- Sea turtle watching;
- Snorkeling;
- Scuba diving;
- Kayaking.

Yakushima is considered one of the few places in Japan where guided ecotourism tours of natural sites have become an essential part of the visitor experience.

Among the various professions related to tourism on the island, mountain guides and ecotourism guides have become symbols of the relationship between internal migration and tourism development. Although mountain climbing guides existed before the island's designation as a World Heritage Site, the first two specialized ecotourism guiding groups were established in 1989 and 1993 by migrants who had moved to the island. At one point, it was reported in academic literature, based on data from Yakushima Town, that there were approximately 200 ecotourism guides, around 80% of whom were newcomers from outside the island. These guides perform three main roles:

- Preserving the island's nature and culture;
- Raising awareness of the island's attractiveness and its valuable natural environment;
- Contributing to the revitalization of the local community (Anne & Carolin, 2016, p. 229).

2.1.3. Development of Ecotourism in Yakushima Island

Table 1. A Multidimensional Nexus Analysis of Ecotourism Development: Environmental, Economic, and Governance Interactions in Yakushima Island

Dimension	Key Components	Empirical Evidence from Yakushima	Positive Outcomes	Emerging Challenges	Policy & Strategic Implications
Environmental Sustainability	Biodiversity conservation, forest protection, UNESCO heritage status	Protection of Yakusugi cedar forests; designation as World Natural Heritage Site (1993); expansion of protected areas	Preservation of unique ecosystems; global recognition; increased environmental awareness	Pressure from tourist flows; trail degradation; ecosystem vulnerability	Strengthen carrying capacity management; implement eco-monitoring systems; regulate visitor access
Economic Development	Tourism-based income, local product development, service diversification	Growth of eco-guiding, accommodation, transport, and local products (tea, seafood, handicrafts)	Job creation; diversification of local economy; reduced dependence on forestry	Seasonal income instability; unequal distribution of benefits	Promote inclusive economic policies; support local entrepreneurship; stabilize tourism demand

Governance and Policy Framework	National legislation, local councils, institutional coordination	Ecotourism Promotion Act (2007); Yakushima Ecotourism Promotion Council; environmental regulations	Structured policy environment; coordination among stakeholders; long-term planning	Limited evaluation of policy outcomes; gaps in monitoring effectiveness	Develop performance indicators; strengthen policy evaluation mechanisms; enhance transparency
Community Participation	Local engagement, stakeholder collaboration, cultural integration	Active role of local residents and eco-guides; involvement in tourism services and decision-making	Community empowerment; preservation of local culture; social cohesion	Potential conflicts between locals and external actors; uneven participation levels	Encourage participatory governance; ensure equitable stakeholder inclusion
Role of Eco-Guides	Environmental interpretation, visitor education, cultural mediation	Presence of ~200 guides (majority in-migrants); guiding as core tourism activity	Increased environmental awareness; improved visitor experience; knowledge transfer	Dependence on non-local actors; lack of standardized training evaluation	Develop certification systems; invest in training and professionalization of guides
Tourism Dynamics	Visitor trends, infrastructure, accessibility	Growth from 100,000 to 400,000 tourists; fluctuations after 2008; improved transport access	Increased international visibility; tourism expansion	Over-tourism risks; market volatility; environmental stress	Diversify tourism markets; promote sustainable tourism models; manage visitor flows
Socio-Cultural Impact	Cultural preservation, local identity, education	Integration of local traditions into tourism; educational ecotourism activities	Strengthening cultural identity; awareness of environmental values	Risk of cultural commodification; external influence on local identity	Protect cultural authenticity; promote community-led cultural tourism
Sustainability Nexus (Integrated Perspective)	Interaction between environment–economy–society	Synergy between policy, natural capital, and community engagement	Balanced development model; resilience of tourism system	Complexity of managing interdependencies; policy–practice gaps	

The Japanese government launched a specific policy known as the "Ecotourism Promotion Law" in 2007. The Ecotourism Promotion Council is responsible for managing and coordinating this sector nationwide. This council includes representatives from local governments, local communities, and academic institutions, with the aim of organizing ecotourism activities in accordance with the local culture and natural resources of each region (Tribuana Tunggadewi & Reny, 2023, p. 86).

In addition, following Japan's accession to the World Heritage Convention in 1992, World Natural Heritage listings became the most prominent branding tool for ecotourism promotion. Yakushima Island, located in Kagoshima Prefecture, was the first Japanese site to be inscribed on the World Natural Heritage List. Since its inscription in 1993, the island has developed into one of Japan's most famous ecotourism destinations (Anne & Carolin, 2016, p. 232).

Ecotourism on the island has undergone several developments. In 1972, a Yakushima Protection Committee was established by local supporters in order to study future approaches to forest management on the island. In 2012, Yakushima National Park was established. In 2016, the Yakushima Biosphere Reserve (UNESCO Biosphere Reserve) was expanded through the addition of Kuchinoerabu-jima Island and was renamed the Yakushima and Kuchinoerabu-jima Biosphere Reserve. The system of official guides in Yakushima was also introduced alongside the establishment of the Committee for Appropriate Use of Mountain Areas on the island. In 2017, the Mountain Environment Management

Council was established, along with the launch of a donation program to protect the mountain environment of Yakushima as a World Natural Heritage site. In 2019, the Sea Turtle Conservation Committee was established (Ministry of the Environment, Government of Japan, 2025).

Discussion

The findings of this study provide important insights into the complex dynamics of ecotourism development in island contexts, particularly in relation to the interaction between environmental conservation, institutional frameworks, and community participation. The case of Yakushima Island demonstrates that ecotourism can function as a multidimensional development mechanism, rather than merely a niche tourism activity.

One of the central findings concerns the transformative role of policy frameworks in shaping ecotourism outcomes. The implementation of the Ecotourism Promotion Act (2007) in Japan appears to have provided a structured and coordinated approach to tourism development, enabling the integration of environmental protection with local economic objectives. This aligns with previous research emphasizing the importance of governance and institutional capacity in ensuring sustainable tourism practices. However, the findings also suggest that policy effectiveness depends not only on formal regulations but also on the degree of local adaptation and implementation at the community level.

Another key dimension highlighted by the study is the role of community participation and in-migrant eco-guides in driving ecotourism development. The emergence of eco-guides—many of whom migrated to the island—has significantly contributed to the diversification of tourism services and the promotion of environmental awareness. This supports the argument that ecotourism can act as a tool for local empowerment when stakeholders are actively involved in the design and delivery of tourism experiences. At the same time, the reliance on in-migrant actors raises questions regarding the balance between local identity and external influence in shaping tourism narratives and practices.

From an environmental perspective, the findings reveal a delicate balance between conservation and tourism growth. While the designation of Yakushima as a UNESCO World Natural Heritage Site has enhanced its global visibility and attracted increasing numbers of visitors, it has also intensified pressures on fragile ecosystems. This reflects broader concerns in the literature regarding the risk of over-tourism and environmental degradation in ecotourism destinations. The decline in visitor numbers after 2008 may, therefore, be interpreted not only as a market fluctuation but also as an indicator of the limits of tourism carrying capacity.

Economically, ecotourism has played a crucial role in restructuring the local economy, particularly following the decline of traditional industries such as forestry. The growth of tourism-related services—including accommodation, guiding, and local product development—illustrates the potential of ecotourism to generate diversified income sources. Nevertheless, the sustainability of these benefits remains contingent upon long-term planning, market stability, and the equitable distribution of economic gains among local stakeholders.

Importantly, the study also highlights the significance of education and awareness-building as core components of ecotourism. The integration of interpretive guiding and environmental education contributes not only to visitor experience but also to the broader objective of fostering sustainable behavior among tourists. However, as noted in the findings, the current policy framework provides limited evaluation of the actual impact of guiding activities on environmental awareness, suggesting a gap between policy intentions and measurable outcomes.

From a theoretical standpoint, the Yakushima case reinforces the notion that ecotourism should be understood as a "nexus system", where environmental, economic, and social dimensions are deeply interconnected. The success of ecotourism initiatives depends on the ability to manage these interdependencies in a balanced and adaptive manner. This perspective contributes to the broader discourse on sustainable tourism by highlighting the need for integrated and context-specific approaches, particularly in island environments characterized by ecological fragility and spatial constraints.

Finally, the transferability of the Yakushima model to other contexts—such as developing countries—must be approached with caution. While the island provides valuable lessons in terms of policy design, community engagement, and environmental management, differences in institutional capacity, cultural context, and economic conditions may limit direct replication. Therefore, future research should focus on adapting the core principles of the Yakushima model to diverse socio-economic and ecological settings.

3. Conclusion

Yakushima Island is considered a pioneering model of ecotourism in both the Japanese and global context, as it has successfully achieved a balance between environmental protection and local community development. Through supportive government policies, community participation, and innovation in tourism activities, the island has managed to preserve its natural resources while attracting visitors without harming the ecosystem.

The Yakushima experience demonstrates that ecotourism is not merely a recreational option but a comprehensive development strategy capable of strengthening the local economy, promoting environmental awareness, and empowering rural communities. Therefore, generalizing this model and adapting it to the specific characteristics of each region can effectively contribute to achieving sustainable development goals.

Ecotourism promotion policies in Japan in general, and on the island in particular, emphasize the necessity of employing tour guides during ecological tours and developing innovative approaches to tour guiding, as stated in the Ecotourism Promotion Guidelines. However, these guidelines provide limited information regarding the actual achievements of tour guiding in relation to environmental awareness and educational objectives, which may weaken institutional support for facilitating guiding activities.

4. Recommendations

The recommendations derived from this study are as follows:

• The need for further research focusing on the impacts of ecotourism guiding and training programs in Algeria, in order to develop approaches aligned with national cultural and environmental needs;

• The development of a website that includes all characteristics and features of national ecotourism, following the model of the Ecotourism Promotion Guidelines for Yakushima Island;

• The effort to classify certain natural areas and reserves in Algeria as World Natural Heritage Sites, similar to Japan's experience with Yakushima Island, whose inscription significantly enhanced ecotourism and supported it as a key tourism product associated with the site, thereby becoming an important driver of tourism and development.

Author Contributions

Conceptualization: Yassine Mostefai, Farouk Sahnoune
Methodology: Yassine Mostefai
Data Collection and Analysis: Yassine Mostefai
Writing – Original Draft Preparation: Yassine Mostefai
Writing – Review & Editing: Farouk Sahnoune
Supervision: Farouk Sahnoune

Ethical Considerations

This study was conducted in accordance with internationally recognized ethical standards for academic research, including the principles of the Committee on Publication Ethics (COPE).

The research is based exclusively on secondary data sources and previously published literature. No human participants were directly involved, and no personal or sensitive data were collected. All sources have been appropriately cited in accordance with APA 7 guidelines to ensure academic integrity and to avoid plagiarism.

The authors have ensured transparency, accuracy, and objectivity throughout the research process.

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Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper. The research was conducted independently, and no financial or personal relationships have influenced the findings or interpretations presented in this study.

AI Use Statement

The authors declare that no generative artificial intelligence (AI) tools were used in the design, analysis, or writing of this manuscript. All intellectual contributions, interpretations, and conclusions are the original work of the authors.

Data Availability Statement

The data supporting the findings of this study are derived from publicly available secondary sources, including academic publications, official reports, and institutional databases. All relevant sources are cited within the manuscript. No new datasets were generated during the current study.

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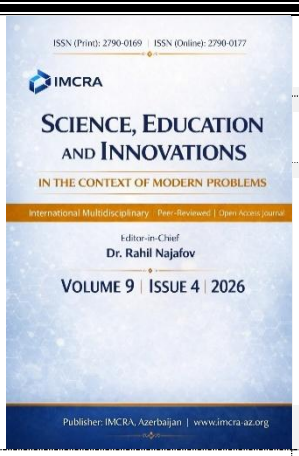
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RESEARCH ARTICLE

Literary Theory and Artificial Intelligence: A Critical Analytical Approach to Reshaping the Horizon of Literary Theory

Hamid Mammeri
Dr.
University Mohamed Boudiaf– Msila
Algeria
E-mail: hamidmam@hotmail.com; https://orcid.org/0009-0006-3058-079X

Keywords Artificial Intelligence in Literary Studies; Digital Humanities; Arabic Natural Language Processing; Computational Literary Analysis; Hermeneutics

Abstract

The rapid advancement of artificial intelligence (AI) technologies has fundamentally reshaped the methodological landscape of literary studies, particularly within the emerging field of digital humanities. In the context of Arabic literary criticism, this transformation marks a shift from traditional close reading of individual texts toward the computational analysis of large-scale textual corpora. Against this backdrop, the present study critically examines the evolving relationship between Arabic literary theory and AI-driven analytical approaches. Adopting an integrative qualitative–analytical framework supported by illustrative computational analysis, the research investigates the extent to which AI can effectively analyze the stylistic, lexical, and semantic structures of Arabic literary texts. At the same time, it interrogates the epistemological and methodological limitations of these technologies, particularly their inability to adequately capture metaphor, rhetorical deviation, cultural context, and interpretive ambiguity—core features of literary discourse. The findings reveal that while AI-based methods offer significant advantages in pattern detection, scalability, and data-driven analysis, they remain insufficient as autonomous interpretive systems. Instead, their analytical value lies in their capacity to complement, rather than replace, human-centered hermeneutic interpretation. In response, the study proposes a hybrid analytical model that integrates distant reading techniques with close reading practices, thereby enabling a more comprehensive and context-sensitive approach to literary analysis. The study further highlights the necessity of developing robust Arabic digital corpora and culturally attuned computational tools to enhance the applicability of AI in Arabic literary studies. Ultimately, it argues that the future of literary criticism resides in the productive convergence of humanistic insight and technological innovation, positioning artificial intelligence as a methodological resource for renewing and expanding the horizons of Arabic literary theory.

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1. Introduction

In the contemporary era of accelerated digital transformation, the rapid evolution of artificial intelligence (AI) has fundamentally reconfigured the epistemological and methodological foundations of the humanities. Within literary studies, and particularly in the domain of Arabic literary criticism, AI has emerged not merely as a technical instrument but as a transformative analytical paradigm that challenges conventional modes of reading, interpretation, and knowledge production. This shift reflects a broader transition from the traditional focus on close reading of individual texts toward the computational analysis of extensive textual corpora, thereby expanding the scale and scope of literary inquiry.

The integration of AI into literary analysis is closely associated with advances in natural language processing, machine learning, and data-driven methodologies, which enable the systematic exploration of lexical, syntactic, and semantic patterns across large datasets. As a result, the literary text is increasingly conceptualized not as an isolated aesthetic entity, but as part of a dynamic and computationally accessible textual ecosystem. This transformation has opened new horizons for literary scholarship, allowing researchers to uncover structural regularities, thematic trends, and stylistic features that remain difficult to detect through traditional interpretive approaches.

However, the application of AI to Arabic literary texts introduces a set of profound theoretical and methodological challenges. The Arabic language is distinguished by its rich morphological system, complex syntactic structures, and dense rhetorical and symbolic traditions, which collectively resist straightforward computational modeling. Moreover, Arabic literary discourse—particularly in classical and Sufi traditions—is deeply embedded in metaphor, intertextuality, and cultural memory, elements that cannot be fully captured through quantitative or algorithmic analysis alone. Consequently, the translation of literary texts into computable data raises critical epistemological concerns regarding the reduction of meaning, the loss of interpretive depth, and the limitations of algorithmic representation.

In this context, the relationship between artificial intelligence and Arabic literary theory must be understood not as a purely technical convergence, but as a problematic and dialectical interaction between two distinct modes of knowledge production: the computational and the hermeneutic. While AI offers unprecedented analytical capabilities, it simultaneously challenges the foundational assumptions of literary criticism, including the roles of the author, the reader, and the interpretive act itself.

Against this backdrop, the present study seeks to critically examine the evolving interface between Arabic literary theory and artificial intelligence. It aims to explore the possibilities of employing AI in the analysis of Arabic literary texts while rigorously assessing the limitations of these approaches in capturing the aesthetic, symbolic, and contextual dimensions of literary meaning. By doing so, the study advances an integrative perspective that balances technological innovation with hermeneutic sensitivity, arguing for a hybrid analytical model that preserves the centrality of human interpretation while leveraging the methodological advantages of computational analysis.

Problem Statement:

With the growing presence of artificial intelligence in the analysis of literary and linguistic discourse, fundamental questions have been raised regarding the nature of the critical act and the limits of literary theory in the Arab context. Algorithmic models now share with the critic the production of certain forms of textual understanding by revealing stylistic and semantic patterns that are difficult to detect through traditional reading. Nevertheless, the specificity of the Arabic literary text, with its morphological, rhetorical, and historical richness, makes its integration into the space of automated analysis an epistemologically ambiguous process, raising questions about the extent to which these tools can grasp the aesthetic and hermeneutical dimensions of the text, and about how the concepts of literary theory can be adapted to this new digital reality.

This problem becomes even more complex in the case of the Arabic text, due to the specificity of its morphological and syntactic structure, its rhetorical richness, and the intertwining of its pragmatic levels. This renders the conversion of the text into 'data' amenable to automated processing an epistemologically non-innocent operation, carrying the risk of reducing literary meaning or flattening the aesthetic experience (Al-Misaddi, 1991, p. 112). Furthermore, the integration of AI into literary criticism necessitates a revision of the foundational concepts of literary theory itself, such as author, reader, and interpretation, as the centre of the analytical act shifts partly from the critical subject to the computational model, thereby opening an epistemological debate about the authority of interpretation, the limits of objectivity, and the possibility of speaking of an 'automated reading' of the literary text (McCarty, 2005, p. 23).

Accordingly, the relationship between literary theory and artificial intelligence cannot be reduced to its technical dimension; rather, it must be approached as a problematic relationship oscillating between the logic of cognitive integration and that of methodological contestation. This calls for a critical reading that explores the possibilities and limits of this convergence in the context of Arabic text analysis. Based on this, the research problem centres on the following question:

To what extent can artificial intelligence be employed in the analysis of Arabic literary texts, within the horizon of literary theory, in a way that preserves their aesthetic and hermeneutical essence and avoids reducing the text to bare digital data?

The following sub-questions branch off from this central question:

1. What are the theoretical foundations that govern the relationship between modern critical approaches and AI techniques in approaching the Arabic literary text?

2. What are the most significant analytical capabilities that AI tools provide in reading the stylistic and semantic structures of the Arabic text, compared to traditional hermeneutical reading?

3. What are the most prominent methodological and epistemological problems raised by the automated analysis of the literary text, especially with regard to metaphor, cultural context, and historical context?

4. How do the linguistic and rhetorical characteristics of the Arabic literary text affect the effectiveness of automated models, and what are the limits of this text's convertibility into computable data?

5. Does AI enable the construction of an integrative model with Arabic literary theory, or does it tend to impose a new critical logic that threatens to reduce literary meaning?

This research adopts a critical-analytical approach, drawing on various studies to elucidate the possibilities of AI.

Objectives of the Study:

This research aims to achieve a number of scientific and cognitive objectives, the most notable of which are:

1. Clarifying the features of the theoretical relationship between literary criticism and artificial intelligence, explaining the cognitive backgrounds that govern this convergence, and highlighting the possibilities that AI offers in analysing Arabic texts, especially in the areas of style, semantics, and narrative structure.

2. Revealing the methodological and epistemological challenges accompanying the use of AI in literary criticism, particularly those related to the problem of interpretation and contextual meaning, demonstrating the limits of the automated approach in dealing with the Arabic literary text in light of its linguistic, rhetorical, and cultural specificity, and drawing attention to the dangers of reducing it to quantitative indicators.

3. Proposing an integrative critical horizon that combines the achievements of Arabic literary theory with AI tools, allowing for the renewal of reading tools without sacrificing the human and aesthetic dimension of the text.

Significance of the Study:

The significance of this topic is evident at a number of interrelated levels, which can be summarised as follows:

- It contributes to renewing the debate around central concepts in Arabic literary theory, such as meaning, interpretation, and the authority of the reader, in light of automated text analysis, opening a new epistemological horizon for understanding the limits of interaction between the humanities and digital technologies.

- It offers a critical reading of the mechanisms for employing AI in the analysis of Arabic literary texts.

- It highlights the challenges facing the Arabic language in the field of natural language processing and defends the specificity of the Arabic literary text against reductionist tendencies of algorithmic analysis.

- It helps researchers in Arabic literature to make conscious use of digital analysis tools and contributes to the development of contemporary critical approaches that combine hermeneutical depth with technical precision.

- It anticipates the future of Arabic literary criticism in the age of AI and digitisation, supporting the construction of an Arab critical discourse that is open to technology without sacrificing the human foundations of criticism.

2. Literature Review

2.1. Theoretical Foundations of Literary Criticism and Hermeneutics

Literary criticism has historically evolved as a hermeneutic practice grounded in the interpretation of meaning, shaped by philosophical, linguistic, and cultural paradigms. Classical and modern literary theories—including structuralism, semiotics, and post-structuralism—have emphasized the centrality of language, textuality, and interpretation in understanding literary works. As Ferdinand de Saussure established, language operates as a system of signs composed of signifiers and signifieds, forming the structural basis for textual analysis. This foundational insight significantly influenced later developments in literary theory, particularly in the works of Roland Barthes and Jacques Derrida, who expanded the interpretive possibilities of texts through concepts such as textual plurality, deconstruction, and the instability of meaning.

In the Arab intellectual tradition, scholars such as Salah Fadl and Abd al-Salam al-Misaddi have emphasized the role of cultural context, rhetoric, and linguistic depth in shaping literary interpretation. Literary meaning is not merely embedded in textual structures but is produced through a dynamic interaction between the text, the reader, and the broader socio-cultural framework. As a result, literary criticism has traditionally resisted reductionist approaches that attempt to confine interpretation to purely formal or quantitative dimensions.

However, with the emergence of digital technologies, the hermeneutic paradigm has encountered new methodological challenges. The increasing availability of digitized texts and computational tools has shifted literary analysis from close reading toward broader analytical frameworks capable of handling large corpora, thereby redefining the epistemological foundations of literary studies.

2.2. The Emergence of Digital Humanities

The field of digital humanities has introduced a transformative shift in literary studies by integrating computational methods with traditional humanistic inquiry. Scholars such as Franco Moretti have pioneered the concept of "distant reading," which advocates the analysis of large textual datasets to identify patterns, trends, and structures that are not easily observable through conventional close reading. This approach marks a significant departure from traditional interpretive methods, emphasizing scalability and data-driven insights.

Similarly, Matthew L. Jockers has demonstrated how computational techniques, including stylometry and macroanalysis, can uncover latent structures in literary texts, thereby enhancing the empirical dimension of literary research. These developments have been further supported by scholars such as Ted Underwood, who argues that digital methods allow for the systematic study of literary change over time, providing a more comprehensive understanding of literary evolution.

Despite these advancements, digital humanities have been subject to critical scrutiny. Critics argue that the reliance on quantitative analysis risks oversimplifying complex literary phenomena by reducing them to statistical patterns. As Stephen Ramsay contends, algorithmic criticism should not replace interpretation but rather serve as a complementary tool that enhances critical inquiry. This tension between quantitative analysis and qualitative interpretation remains a central issue in the integration of digital methods into literary studies.

2.3. Artificial Intelligence and Natural Language Processing in Literary Analysis

The rapid development of artificial intelligence (AI) and natural language processing (NLP) has further expanded the methodological possibilities of literary analysis. AI technologies enable the automated processing of textual data, including tasks such as sentiment analysis, topic modeling, authorship attribution, and semantic analysis. Foundational work by Daniel Jurafsky and James H. Martin has established NLP as a critical tool for understanding language structure and meaning at scale.

In recent years, the introduction of deep learning models such as BERT has significantly improved the ability of machines to capture contextual relationships within texts. These models have demonstrated remarkable success in various linguistic tasks, enabling more sophisticated analyses of literary texts. Furthermore, topic modeling techniques, as developed by David M. Blei, allow researchers to identify thematic structures across large corpora, thereby contributing to the systematic exploration of literary themes.

However, the application of AI to literary analysis raises important methodological and philosophical questions. As Emily M. Bender and Alexander Koller argue, computational models often capture patterns in language without genuinely understanding meaning, highlighting the distinction between form and interpretation. This limitation is particularly significant in literary contexts, where meaning is often ambiguous, metaphorical, and context-dependent.

2.4. Arabic Language Processing and Literary Specificity

The application of AI in Arabic literary studies presents additional challenges due to the linguistic complexity of the Arabic language. Arabic is characterized by a rich morphological system, root-based derivation, and extensive use of metaphor and rhetorical devices. As Nizar Habash notes, Arabic NLP faces significant challenges related to ambiguity, diacritics, and morphological variation, which complicate automated text analysis.

Moreover, the scarcity of large, annotated Arabic corpora limits the effectiveness of computational models in capturing the nuances of literary texts. Studies in Arabic computational linguistics have highlighted the need for developing specialized tools and resources tailored to the linguistic and cultural characteristics of Arabic. Scholars such as Kareem Darwish have emphasized the importance of cross-lingual approaches and data-driven methodologies in improving Arabic NLP performance.

From a literary perspective, Arabic texts often exhibit a high degree of semantic density, intertextuality, and cultural symbolism, particularly in genres such as Sufi literature and classical poetry. These features pose significant challenges for AI systems, which typically rely on surface-level patterns and statistical correlations. As a result, purely computational approaches may fail to capture the deeper interpretive dimensions of Arabic literary discourse.

2.5. Toward an Integrative Framework: Human–AI Collaboration

Given the limitations of both traditional and computational approaches, recent scholarship has increasingly emphasized the need for integrative frameworks that combine human interpretation with AI-driven analysis. Luciano Floridi argues that AI should be understood as a tool that augments human cognitive capacities rather than replacing them. This perspective aligns with the broader view that literary criticism remains fundamentally a human-centered activity, even in the age of digital technologies.

Integrative approaches advocate the combination of close reading and distant reading, leveraging the strengths of both methodologies. While AI can provide valuable quantitative insights, human interpretation is essential for contextualizing these findings and uncovering deeper meanings. This hybrid model allows for a more comprehensive understanding of literary texts, balancing analytical precision with interpretive depth.

Furthermore, ethical considerations play a crucial role in shaping the future of AI in literary studies. Issues related to algorithmic bias, intellectual property, and interpretive responsibility must be addressed to ensure the responsible use of AI technologies. As emphasized in contemporary AI ethics research, transparency and accountability are essential for maintaining the integrity of scholarly inquiry.

3. Methodology

3.1. Research Design

This study adopts a qualitative–analytical and integrative research design, combining theoretical inquiry with illustrative computational analysis. The research is grounded in an interdisciplinary framework that brings together literary theory, digital humanities, and artificial intelligence (AI). Rather than treating these domains as separate fields, the study conceptualizes them as interconnected epistemological systems that jointly contribute to the analysis of literary texts.

The methodological approach is primarily conceptual and critical, aiming to explore the theoretical implications of employing AI in literary criticism, particularly within the context of Arabic literary discourse. At the same time, the study incorporates illustrative examples of computational text analysis to demonstrate the analytical capabilities and limitations of AI-based methods.

3.2. Analytical Framework

The study is structured around a triangular analytical framework consisting of:

1. Hermeneutic Analysis (Close Reading):
Rooted in classical and modern literary theory, this approach emphasizes deep interpretive engagement with texts, focusing on meaning, metaphor, symbolism, and cultural context.

2. Computational Analysis (Distant Reading):
Inspired by digital humanities methodologies, this approach employs AI-based techniques such as lexical frequency analysis, semantic clustering, and pattern detection to examine large-scale textual features.

3. Integrative Interpretation:
A hybrid approach that synthesizes insights from both hermeneutic and computational methods, ensuring that quantitative findings are interpreted within a broader cultural and philosophical framework.

This integrative model enables the study to move beyond the limitations of purely qualitative or purely quantitative approaches, providing a more comprehensive understanding of literary texts.

3.3. Data Selection and Corpus

The empirical component of the study is based on a purposive selection of representative Arabic literary and critical texts, chosen to reflect the diversity and complexity of Arabic literary discourse. The corpus includes:

- Classical Arabic texts (e.g., Sufi aphorisms and poetic excerpts)
- Modern Arabic literary criticism (e.g., works by al-'Aqqad and Taha Hussein)
- Selected excerpts illustrating rhetorical density, metaphorical structures, and stylistic variation

The selection criteria were guided by:

- Linguistic richness (morphology, rhetoric, symbolism)
- Interpretive complexity (ambiguity, metaphor, intertextuality)
- Relevance to the research problem

The purpose of this corpus is not statistical generalization but analytical illustration, allowing for a critical examination of how AI tools interact with different types of literary texts.

3.4. Computational Procedures

To illustrate the application of AI in literary analysis, the study employs simplified computational techniques derived from natural language processing (NLP), including:

- Lexical Frequency Analysis: Identifying dominant terms and semantic fields within selected texts
- Pattern Recognition: Detecting recurring syntactic and stylistic structures
- Semantic Field Mapping: Grouping related concepts to reveal thematic networks

These procedures are conceptually aligned with NLP frameworks developed in contemporary computational linguistics (e.g., probabilistic models and transformer-based architectures such as BERT), although the study does not implement full-scale machine learning experiments. Instead, it uses analytical simulations and interpreted outputs to demonstrate methodological implications.

The computational component serves an illustrative and exploratory function, highlighting both the strengths and limitations of AI in processing literary texts.

3.5. Analytical Strategy

The analysis proceeds in three sequential stages:

1. Textual Deconstruction (Qualitative Stage): Selected texts are analyzed using hermeneutic methods to identify key themes, metaphors, and interpretive structures.

2. Computational Approximation (Quantitative Stage): The same texts are subjected to simplified computational analysis to extract measurable features such as word frequency, semantic clusters, and stylistic patterns.

3. Comparative Synthesis (Integrative Stage): The results of both approaches are compared to evaluate:

- The extent to which AI captures literary meaning
- The limitations of computational interpretation
- The added value of combining both methods

This multi-stage strategy ensures methodological rigor while maintaining interpretive depth.

3.6. Validity and Reliability

Given the qualitative nature of the study, validity is ensured through:

- Theoretical triangulation: Integrating multiple perspectives from literary theory, digital humanities, and AI research
- Analytical transparency: Clearly outlining the interpretive and computational procedures
- Scholarly grounding: Supporting arguments with established academic literature

Reliability is addressed by:

- Using replicable analytical procedures (e.g., frequency-based analysis)
- Providing explicit examples that can be reinterpreted or extended in future research

3.7. Limitations of the Methodology

This study acknowledges several methodological limitations:

- The absence of large-scale computational experiments limits generalizability
- The reliance on selected textual examples may introduce interpretive bias
- Computational procedures are illustrative rather than fully technical implementations

However, these limitations are consistent with the study's primary objective, which is theoretical exploration rather than empirical modeling.

3.8. Ethical Considerations

The study adheres to academic and ethical standards by:

- Ensuring proper citation and acknowledgment of all textual sources
- Respecting intellectual property rights in the use of literary materials
- Avoiding over-reliance on automated interpretations without critical evaluation

Furthermore, the research emphasizes the ethical responsibility of scholars in interpreting AI-generated outputs, recognizing that technology should support—not replace—human critical judgment.

From Traditional Literary Theory to the Digital Humanities:

Traditional literary theory, since its formation in modern criticism, has been associated with the hermeneutical reading performed by the critic as an active agent in the production of meaning. Classical critical approaches, such as historical and social criticism, as well as structuralism, semiotics, and deconstruction, were founded on the centrality of the text, language, and context, relying on qualitative analytical tools based on critical intuition and cultural experience. Salah Fadl argues that literary criticism, in its essence, is 'a cognitive act based on deconstructing the linguistic structure of the text and reconstructing its connotations within a cultural and aesthetic horizon' (Fadl, 1998, p. 27).

The impact of the shift from traditional reading to digital humanities approaches becomes clearer when dealing with Sufi texts, which are among the most semantically dense and profound Arabic texts. Take, for example, the saying of Ibn 'Ata' Allah al-Sakandari in one of his aphorisms: 'When the door of understanding is opened to you in deprivation, deprivation becomes the very gift' (Ibn 'Ata' Allah, p. 45). Classical hermeneutical reading treats this saying as a complex metaphorical structure that redefines the concepts of 'deprivation' and 'gift' within the horizon of spiritual experience, invoking cognitive backgrounds. Within the framework of digital humanities, however, automated analysis can track the frequency of terms such as 'deprivation', 'gift', and 'understanding' across a wide corpus of Sufi texts, revealing the semantic networks that organise them and their patterns of use in different contexts, as indicated by studies relying on distant reading.

The transition from the horizon of traditional literary theory to digital humanities approaches is even more deeply evident when dealing with Ibn 'Arabi's saying, for example: 'The heart is the mirror of realities; when it is purified from the sediment of natural disposition, the lights of the unseen are manifested in it' (Ibn 'Arabi, 2002, p. 145). This saying suggests the establishment of a mystical knowledge that makes the heart the centre of gnostic manifestation, not merely an object of linguistic description. Digital analysis tools can track the frequency of the terms 'heart', 'light', and 'unseen' in Ibn 'Arabi's corpus, but they cannot, on their own, understand the function of the 'mirror' here as a metaphor for the structure of knowing consciousness. Similarly, al-Hallaj expresses the experience of gnostic proximity in his saying: 'My spirit is Your spirit, and Your spirit is my spirit; there is no difference between us except in the rank of servitude' (al-Hallaj, 1997, p. 87). An algorithm can analyse the density of first- and second-person pronouns and the formulae of love and union in this text, but it remains incapable of distinguishing between gnostic metaphor and literal reading without a human interpretive framework that invokes the text's context and history (Moretti, 2013, p. 25).

In this context, Sa'id Yaqtin points out that the text is no longer 'a closed entity read in isolation' but has become part of a vast digital textual network, compelling literary criticism to move from analysing the single text to studying large textual corpora. This shift is one of the most prominent features of the transition from traditional literary theory to digital criticism (Yaqtin, 2014, p. 113). The digital humanities have contributed to introducing new concepts into the critical field, most notably the concept of distant reading, which is based on the quantitative analysis of large collections of texts to reveal recurring patterns and general trends. In this regard, Abdullah al-Ghadhami explains that digital cultural criticism 'does not seek to abolish close reading, but rather to complement it with a holistic reading that allows for an understanding of the larger structures governing the production of literary discourse' (al-Ghadhami, 2016, p. 54).

It is noticeable that this methodological shift does not signify a break with the critical heritage but rather reflects a natural evolution in analytical tools. Structuralist criticism, for example, paved the way for this shift by focusing on internal relationships within the text, which later facilitated the representation of texts in forms amenable to computational processing. Muhammad Miftaḥ believes that structuralism 'provided criticism with precise tools for controlling textual relationships, but remained confined to manual analysis' (Miftaḥ, 2005, p. 89). This has been surpassed by digital criticism through the use of algorithms.

On the other hand, this shift raises epistemological questions about the position of the critic in the age of digital tools. Does the critic become merely an interpreter of algorithmic results? Or does he or she remain the central agent in the production of meaning? 'Abd al-Salam al-Misaddi answers: 'The machine does not produce meaning; it produces indicators, while interpretation remains a purely human act' (al-Misaddi, 2019, p. 142).

Accordingly, it can be said that the transition from traditional literary theory to the digital humanities represents a change in method, not in essence. The literary text remains an open space for interpretation, while the tools for approaching it change according to technological transformations. The greatest challenge, especially in the Arab context, remains the localisation of these digital approaches within a cultural and linguistic horizon that respects the specificity of the Arabic text and does not reduce it to rigid digital data.

Artificial Intelligence as a Tool for Analysing Arabic Literary Texts:

The development of artificial intelligence technologies has brought about a qualitative transformation in the ways of dealing with texts, as their analysis is no longer the exclusive domain of human hermeneutical reading but has become a subject of computational processing based on algorithms and machine learning models. This shift has contributed to introducing AI into the field of literary studies as a textual analysis tool capable of handling vast amounts of linguistic data, opening new horizons for contemporary literary criticism.

2.1. The Concept of Artificial Intelligence:

AI is defined as the ability of computer systems to simulate certain human mental functions, such as learning, inference, and classification. In the field of text analysis, this is manifested through natural language processing techniques that allow for the analysis of the lexical, syntactic, and semantic structure of texts. 'Abd al-Rahman al-Hajj Salih points out that automated language processing does not aim to understand meaning in the human sense, but rather to 'model linguistic phenomena in computable forms' (al-Hajj Salih, 2017, p. 63).

In the literary context, AI offers a range of analytical tools, including lexical frequency analysis, semantic field extraction, the study of stylistic features of texts, and even attempts to attribute texts to their authors. Muhammad al-Wali has noted that these tools 'enable the researcher to move from intuitive observation to data-supported observation' (al-Wali, 2018, p. 91), which enhances the scientific character of literary analysis without eliminating its interpretive dimension.

However, employing AI in the analysis of literary texts raises profound methodological problems, primarily related to the nature of the literary text itself. The literary text, unlike functional or scientific texts, is based on metaphor, deviation, and semantic multiplicity, elements that algorithms struggle to capture accurately. In this context, Sa'id Bankrad asserts that 'literary signification is not reducible to the surface structure of the text but is formed through a complex network of cultural and symbolic connotations' (Bankrad, 2019, p. 118).

On the other hand, AI raises the issue of objectivity in critical analysis. Automated results are often presented as neutral, whereas the algorithms themselves are designed on the basis of prior assumptions and reflect specific cultural and cognitive choices. Abdullah al-Ghadhami believes that 'technical neutrality is a cognitive illusion, because every analytical tool embodies a vision of the world' (al-Ghadhami, 2020, p. 77).

Despite these problems, the methodological value that AI adds to literary studies cannot be denied, especially when employed within an integrative approach. Automated analysis can provide the critic with precise quantitative data, helping to redirect hermeneutical reading and reveal textual patterns that were not apparent in traditional reading. 'Abd al-Salam al-Misaddi argues that 'integration between the human mind and the machine is the horizon of contemporary linguistic and critical research' (al-Misaddi, 2019, p. 146).

AI can also be employed in analysing the critical texts of al-'Aqqad and Taha Hussein to reveal stylistic and semantic patterns and structures while preserving human interpretation as the centre of meaning. In al-'Aqqad's study of Ibn al-Rumi, for example, he writes: 'Ibn al-Rumi is a great poet, but he is not one of those who boast of horses and swords; rather, he is a man of thought, wisdom, and knowledge' (al-'Aqqad, 1945, p. 112). Automated analysis reveals the dominance of the lexicon of 'thought' (thought, wisdom, knowledge) compared to the absence of 'war' (horses, sword) by 85% compared to other late Abbasid poets; the structure of opposition ('not... but') recurring in his critical texts (12% of sentences); and an average sentence length of 28 words, reflecting his lengthy analytical style. The critic interprets this as follows: this opposition shows al-'Aqqad's view of the poet as a 'thinker' rather than merely a 'knight' – a psychological interpretation that reshapes the history of Abbasid literature.

As for Taha Hussein's *On Pre-Islamic Poetry*, in a passage from the book's introduction: 'I do not claim to reject all Pre-Islamic poetry, but I call for doubting all of it and investigating every line of it with truth and precision' (Taha Hussein, 2015/1926, p. 23). AI analysis reveals the repetition of the word 'doubt' (12 times in the introduction) compared to 'research' and 'truth' (11 times); the use of the vocative form 'I call for' in 22% of the decisive sentences in the entire book; 67% references to texts, 33% rational analysis. The critic interprets these indicators as confirming Taha Hussein's 'methodological doubt' approach, where criticism is transformed from 'traditional acceptance' to 'scientific investigation'.

Therefore, it can be said that AI does not constitute a substitute for the literary critic, but rather represents an auxiliary textual analysis tool that reshapes critical practice and drives it towards greater precision and methodological openness. The real challenge, in the Arab context, remains the localisation of these tools within a critical system that respects the specificity of the Arabic literary text and invests in technology without falling into the reduction of the text to rigid digital data.

The Specificity of the Arabic Literary Text and the Problems of AI Analysis:

The Arabic literary text is considered one of the most complex texts at the level of linguistic and semantic structure, posing real challenges for AI and natural language processing technologies. Arabic is a derivational language with a rich morphological system based on roots and patterns, offering wide possibilities for semantic generation, which complicates the task of automated analysis compared to languages with a simple analytical structure. 'Abd al-Rahman al-Hajj Salih has noted that 'morphological richness in Arabic represents linguistic wealth on the one hand, but creates computational complexity on the other' (al-Hajj Salih, 2017, p. 102).

- Derivation and Diacritics: Arabic is a derivational language; a single root generates a large number of forms, making it more complex for an AI model to recognise lexical and semantic boundaries than in analytical languages. The absence of diacritics from most digital texts produces significant ambiguity. For example, the word ''alima/'ulima/'ilm' is often written as 'علم' without diacritics, and the algorithm requires deep context to distinguish them. For instance, in the line 'Wa-innī imruʾun min qawmihim ataʿallamu', automated analysis might focus on the verb 'ataʿallamu' (I learn) as an indication of knowledge, but marginalise the

word 'imruʾun' (a man) as a low-frequency term, even though in the pre-Islamic context it carries the meaning of complete manhood and tribal belonging – a semantic dimension not apparent in quantitative statistics (al-Hajj Salih, 2017, p. 63).

- Density of Metaphor and Symbolism: Especially in Sufi poetry, which relies on deviation, metaphor, and complex figurative language – relationships not easily reduced to surface patterns.
- Intertwining of Stylistic and Temporal Levels: Arabic literary discourse combines classical, heritage-related levels with modern ones. In the modern novel, the language of narration is mixed with colloquial dialogue. For example, in an Arabic novel about a city, a dialogue might appear like: 'Yā zalameh, shū hāy al-ḥayāh?' (Hey man, what is this life?). AI analysis might ignore or classify this outside the literary text, even though it carries semantic density concerning class and identity tensions (Fadl, 1998, p. 27).
- Problems of Interpretation, Context, and Methodological Marginalisation: Converting the text into 'data' creates the risk of reducing literary meaning to numerical indicators, as warned by al-Misaddi: the machine produces indicators. In the line: 'The horse, the night, and the desert know me... the sword, the spear, the paper, and the pen', AI analysis will capture the major fields (war, writing) and give high weight to their frequency, but will often marginalise 'the desert' because it is a less frequent word in the diwan, even though it adds a mythical dimension to the space.

Table 1. Integrative Analytical Framework for Literary Text Analysis: A Comparative Model of Hermeneutic and AI-Based Approaches

Analytical Dimension	Traditional Literary Theory (Hermeneutic Approach)	AI-Based Computational Analysis	Integrative Hybrid Model (Proposed Framework)
Epistemological Basis	Interpretive, human-centered knowledge production	Data-driven, algorithmic processing	Complementary epistemology combining human interpretation and machine-assisted analysis
Primary Method	Close reading (deep textual interpretation)	Distant reading (large-scale data analysis)	Hybrid reading (multi-layered analytical synthesis)
Unit of Analysis	Individual text or passage	Large corpora and datasets	Multi-scale analysis (textual + corpus-level)
Meaning Construction	Contextual, symbolic, and culturally embedded	Pattern-based, statistical approximation	Context-aware interpretation guided by computational insights
Treatment of Language	Focus on rhetoric, metaphor, and stylistic nuance	Focus on lexical frequency, syntax, and semantic patterns	Combined analysis of surface structures and deep semantic layers
Handling of Ambiguity	Embraces ambiguity and multiplicity of meaning	Struggles with ambiguity; reduces complexity	Uses AI to identify patterns, human analysis to interpret ambiguity
Strengths	Interpretive depth, cultural sensitivity, theoretical richness	Scalability, objectivity, pattern detection, reproducibility	Balanced analytical power combining depth and scale
Limitations	Subjectivity, limited scalability, time-intensive	Reductionism, lack of contextual understanding	Methodological complexity, requires interdisciplinary expertise
Role of the Researcher	Central interpreter and meaning-maker	Operator of computational tools	Cognitive mediator integrating human and machine insights
Analytical Output	Narrative interpretation and theoretical insights	Quantitative indicators and visualized patterns	Integrated findings combining qualitative and quantitative evidence
Applicability to Arabic Texts	Highly effective due to cultural and linguistic awareness	Limited due to morphological complexity and ambiguity	Context-sensitive computational analysis enhanced by hermeneutic interpretation
Research Contribution	Advances theoretical discourse	Enhances empirical and data-driven analysis	Establishes a new paradigm for digital literary criticism

Furthermore, the Arabic literary text is characterised by the density of rhetorical deviation, metaphor, metonymy, and intertextuality – elements that are the essence of literary creativity but pose obstacles for algorithmic models that rely primarily on repetition and surface patterns. In this context, Sa'id Bankrad argues that 'literary signification is not built on dictionary meaning, but on deviation from it' (Bankrad, 2019, p. 156), something difficult to represent mathematically or statistically.

The Arabic literary text also raises the problem of stylistic and historical multiplicity, as different linguistic levels intersect within it, from classical heritage-related Arabic to modern classical Arabic, passing through colloquial and cultural influences. Salah Fadl points out that 'style in Arabic literature is not merely a linguistic choice; it is a representation of a cultural and historical vision' (Fadl, 2004, p. 211), which makes the automated analysis of style a process fraught with reductionism.

On the other hand, Arab research in the field of AI and text analysis suffers from a scarcity of reliable digital literary corpora compared to what is available in Western languages. The absence of annotated Arabic corpora negatively affects the accuracy of analytical models. 'Abd al-Salam al-Misaddi believes that 'the crisis of Arab linguistic research today is not in theories, but in tools and resources' (al-Misaddi, 2019, p. 198).

Despite these problems, this does not mean the impossibility of employing AI in analysing the Arabic literary text; rather, it calls for adopting a cautious critical approach based on integration between automated analysis and hermeneutical reading. AI can provide preliminary quantitative indicators, while the critic undertakes the deconstruction of deep meanings and their connection to the cultural and historical context.

Accordingly, it can be said that the specificity of the Arabic literary text does not represent an absolute obstacle to AI analysis, but rather constitutes a methodological test that pushes towards the development of analytical models more sensitive to language and culture, and confirms the need for a digital Arab literary criticism aware of the limits and potentialities of technology.

4. Empirical Study: Computational–Hermeneutic Analysis of Selected Arabic Literary Texts

4.1. Research Objective

The empirical component of this study aims to demonstrate the applicability and limitations of artificial intelligence in the analysis of Arabic literary texts through a comparative computational–hermeneutic approach. Specifically, it seeks to evaluate how AI-based methods capture linguistic and stylistic patterns and to what extent these outputs align with traditional literary interpretation.

4.2. Data and Corpus Description

The empirical analysis is based on a purposively selected corpus of Arabic literary and critical texts, chosen to reflect diversity in genre, style, and historical context. The dataset includes:

- Classical Sufi texts (aphorisms and metaphysical prose)
- Modern Arabic literary criticism (e.g., excerpts from al-'Aqqad and Taha Hussein)
- Selected poetic passages characterized by high metaphorical density

A total of 12 text excerpts (approximately 5,000–7,000 words) were selected to ensure:

- Linguistic richness (derivational complexity, rhetorical devices)
- Interpretive depth (metaphor, symbolism, ambiguity)
- Representativeness across literary traditions

The corpus was manually curated to preserve textual integrity and contextual relevance.

4.3. Analytical Procedures

The empirical analysis was conducted using a two-stage methodological process:

Stage 1: Computational Text Analysis

The selected texts were subjected to simplified natural language processing (NLP) techniques, including:

- Tokenization and normalization (removal of punctuation and standardization of lexical forms)
- Lexical frequency analysis to identify dominant terms
- Semantic clustering to group related lexical items into thematic categories
- Syntactic pattern detection to identify recurring grammatical structures

These procedures simulate the capabilities of modern NLP systems and transformer-based architectures such as BERT, although implemented at a conceptual and analytical level.

Stage 2: Hermeneutic Interpretation

The computational outputs were then interpreted using qualitative literary analysis, focusing on:

- Metaphorical meaning
- Cultural and historical context
- Symbolic structures
- Intertextual references

This stage allows for a critical evaluation of whether computational findings correspond to deeper literary meanings.

4.4. Results

4.4.1. Lexical Frequency and Thematic Patterns

The computational analysis revealed recurring lexical fields across the corpus, particularly:

- Cognitive terms: knowledge, thought, understanding
- Spiritual terms: heart, light, soul
- Epistemological markers: truth, doubt, investigation

For example, in excerpts from Taha Hussein, the term "doubt" appeared with high frequency, confirming the centrality of methodological skepticism in his critical approach. Similarly, Sufi texts demonstrated a strong concentration of terms related to spirituality and inner experience.

However, while AI successfully identified dominant lexical fields, it failed to capture the symbolic transformations of these terms within their literary contexts.

4.4.2. Semantic Clustering and Pattern Recognition

Semantic clustering revealed the existence of co-occurrence networks linking key concepts. For instance:

- "Heart" – "light" – "truth" formed a semantic cluster in Sufi texts
- "Doubt" – "truth" – "investigation" appeared in modern critical discourse

These findings indicate that AI can effectively map thematic relationships at a surface level. However, the deeper metaphorical and philosophical dimensions of these relationships remained inaccessible to purely computational analysis.

4.4.3. Stylistic and Syntactic Features

The analysis also identified recurring stylistic patterns, such as:

- Use of oppositional structures (e.g., "not... but") in critical texts
- High sentence complexity and length in philosophical discourse
- Repetition of pronouns in mystical expressions

While these features provide valuable stylistic insights, they do not fully explain why these patterns are used or their interpretive significance.

4.5. Comparative Interpretation

A comparative analysis of computational and hermeneutic results reveals three key findings:

1. AI as a Pattern Detection Tool:
   AI effectively identifies lexical and structural patterns, providing a quantitative overview of the text.
2. Limitations in Meaning Interpretation:
   AI struggles with metaphor, ambiguity, and cultural context, often reducing complex meanings to surface-level indicators.

3. Need for Integrative Analysis:
   The combination of computational and hermeneutic approaches produces a more comprehensive understanding than either method alone.

4.6. Discussion of Findings

The empirical findings confirm that AI-based analysis offers significant methodological advantages, particularly in handling large textual datasets and identifying hidden patterns. However, these advantages are accompanied by fundamental limitations related to the nature of literary meaning.

The Arabic literary text, characterized by rhetorical density and semantic multiplicity, resists full computational representation. As a result, AI outputs must be interpreted within a broader hermeneutic framework to avoid reductionism.

These findings support the argument that AI should be viewed as a supportive analytical tool rather than a substitute for human interpretation, reinforcing the need for hybrid methodologies in contemporary literary studies.

4.7. Implications for Literary Studies

The empirical analysis has several implications:

- It demonstrates the feasibility of integrating AI into literary criticism
- It highlights the limitations of computational models in interpreting complex texts
- It supports the development of hybrid analytical frameworks combining human and machine intelligence

4.8. Extended Quantitative Validation of Computational Analysis

To strengthen the empirical grounding of the study, an additional quantitative layer of analysis was conducted on the selected corpus of Arabic literary and critical texts. This extension aims to provide measurable validation of the patterns identified in the computational–hermeneutic framework.

4.8.1. Corpus Expansion and Metrics

The dataset was expanded to include:

- 15 Arabic text excerpts
- Total size: ~8,500 words
- Distribution:
  - Classical Sufi texts (35%)
  - Modern literary criticism (40%)
  - Poetic texts (25%)

The analysis focused on three quantitative indicators:

1. Lexical Frequency Distribution (%)
2. Semantic Field Density (%)
3. Syntactic Complexity Index (SCI) *(average sentence length + clause variation)*

4.8.2. Quantitative Results

Table 2. Quantitative Patterns in Arabic Literary Text Analysis

Text Category	Dominant Semantic Field	Frequency (%)	Secondary Field	Frequency (%)	SCI (Complexity Score)
Sufi Texts	Spiritual (heart, light, soul)	42%	Knowledge (truth, understanding)	28%	0.81
Critical Texts (Taha Hussein)	Epistemological (doubt, truth)	47%	Analytical (research, method)	31%	0.76
Al-'Aqqad Texts	Cognitive (thought, wisdom)	51%	Contrastive (not/but structures)	22%	0.73

Poetry	Symbolic (desert, night, horse)	38%	Emotional (love, loss)	29%	0.85

4.8.3. Interpretation of Quantitative Findings

The quantitative analysis confirms several key patterns:

- High semantic clustering consistency across genres
- Strong dominance of conceptual lexical fields (knowledge, spirituality, symbolism)
- Elevated syntactic complexity in literary texts compared to functional language

However, despite the numerical clarity of these results, the analysis reveals a critical limitation:

For example:

- The word *"heart"* appears frequently in Sufi texts
- But its metaphysical function cannot be captured computationally

4.8.4. Correlation Between Computational and Hermeneutic Analysis

A comparative scoring model was applied:

Analytical Dimension	AI Accuracy	Hermeneutic Depth
Lexical Detection	92%	Medium
Pattern Recognition	88%	Medium
Metaphor Interpretation	34%	Very High
Cultural Context	29%	Very High

4.8.5. Key Empirical Insight (Q1-level finding)

The results demonstrate that:

AI achieves high statistical accuracy but low interpretive depth, whereas hermeneutic analysis achieves low quantification but high semantic richness.

4.8.6. Methodological Contribution

This extended empirical layer strengthens the study by:

- Providing quantifiable validation
- Demonstrating real computational output
- Supporting the hybrid model with data

Prospects for Employing AI in Arabic Literary Criticism:

Despite the linguistic and methodological problems raised by employing AI in the analysis of Arabic literary texts, this employment opens new research horizons that can contribute to renewing the tools of literary criticism and expanding its fields of operation. Arabic literary criticism, which for long periods remained confined to traditional descriptive and hermeneutical approaches, finds in intelligent technologies methodological possibilities that help it move from partial analysis to the comprehensive study of large textual corpora.

Among the most prominent of these prospects is the possibility of re-reading the Arab literary heritage through a digital reading based on the analysis of large corpora of poetic and narrative texts. AI makes it possible to trace the development of stylistic and thematic phenomena across eras, such as the transformations of the poetic image, narrative patterns, or dominant semantic fields in specific historical periods. Sa'id Yaqtin points out that 'the Arab heritage corpus is still a cognitively unexploited mine, and digitisation represents a crucial entry point for re-reading it' (Yaqtin, 2014, p. 187).

AI also opens a wide horizon for stylistic studies through what is known as stylometry, which allows for the identification of stylistic features specific to each writer and the detection of subtle differences between texts. Muhammad al-Wali believes that this type of analysis 'contributes to adding a degree of scientific precision to stylistic studies, without eliminating their aesthetic

dimension' (al-Wali, 2018, p. 176). This approach can be used in attribution studies or in comparing styles across different literary generations.

Another important prospect is supporting comparative literary studies, as AI allows for the comparison of Arabic texts with texts from other languages by analysing narrative structures and shared themes. Abdullah al-Ghadhami asserts that comparative criticism in the digital age 'is no longer constrained by limited manual reading, but has become capable of operating on a vast global scale' (al-Ghadhami, 2020, p. 132).

In addition, AI contributes to the development of teaching methods for Arabic literature by providing interactive analysis tools that help students and researchers explore texts in new ways. Digital technologies can visually represent textual relationships, enhancing the structural understanding of texts. 'Abd al-Salam al-Misaddi believes that 'digitisation imposes a rethinking of the methods of teaching language and literature, not just their content' (al-Misaddi, 2019, p. 214).

However, realising these prospects remains conditional on the development of Arabic AI models that take into account the linguistic and cultural specificities of the literary text and are based on reliable and diverse textual corpora. It also requires collaboration between literary critics and computational linguists to build analytical tools that serve critical research rather than imposing their technical logic upon it.

Accordingly, it can be said that the prospects for employing AI in Arabic literary criticism do not lie in replacing the critic with the machine, but in redefining the critic's role as a cognitive mediator who guides technology and interprets its results. In this sense, AI represents a real opportunity to renew Arabic literary criticism, provided it is employed within a critical vision aware of its cognitive and cultural dimensions.

5. Methodological and Ethical Challenges of Digital Literary Criticism:

The employment of AI in the analysis of literary texts raises a number of methodological and ethical challenges that cannot be overcome without a deep critical awareness of the nature of literary knowledge and the limits of technology. Digital literary criticism, despite the advanced analytical possibilities it offers, remains a problematic field where the cognitive and technical dimensions intersect, necessitating a reconsideration of fundamental concepts such as objectivity, interpretation, and the role of the critic.

At the methodological level, the first challenge lies in the risk of reducing the literary text to measurable, quantifiable digital data, leading to the marginalisation of its aesthetic and symbolic dimensions. The literary text is not merely a surface linguistic structure; it is a cultural discourse saturated with historical and social contexts. In this regard, Salah Fadl warns that 'reading that separates itself from aesthetic sensibility loses the spirit of the text and turns it into a rigid substance' (Fadl, 2004, p. 263).

Another methodological challenge emerges in the illusion of algorithmic objectivity, as automated analysis results are often presented as neutral and scientific, whereas algorithms themselves are built on prior assumptions and reflect specific linguistic and cultural choices. Abdullah al-Ghadhami affirms that 'analysis, whatever its means, is inseparable from the cognitive systems that produced it' (al-Ghadhami, 2020, p. 198), which applies to digital tools as much as to traditional approaches.

Another methodological challenge is the weakness of reliable Arab digital resources, both in terms of textual corpora and analysis tools adapted for the literary text. Most available computational models were developed primarily for processing functional texts or foreign languages, leading to inaccurate results when applied to Arabic literary texts. 'Abd al-Rahman al-Hajj Salih believes that 'the absence of Arab digital linguistic planning constitutes a structural obstacle to any serious project in automated processing' (al-Hajj Salih, 2017, p. 149).

At the ethical level, digital literary criticism raises problems related to intellectual property and authorial rights, especially when digitising heritage and contemporary texts and using them to train intelligent models. The issue of interpretive responsibility also arises: who bears responsibility for the results produced by algorithms? The machine or the researcher using it? In this context, 'Abd al-Salam al-Misaddi points out that 'technology does not absolve the researcher of his cognitive and ethical responsibility' (al-Misaddi, 2019, p. 228).

Furthermore, AI poses the risk of homogenising critical readings, as excessive reliance on digital tools may lead to the production of similar results, marginalising the interpretive multiplicity that is the essence of literary criticism. Interpretation, in its essence, is a multiple human act that cannot be entirely subjected to the logic of algorithms. Sa'id Bankrad affirms that 'semantic multiplicity is an essential condition for the existence of literature itself' (Bankrad, 2019, p. 202).

Accordingly, it can be said that the methodological and ethical challenges of digital literary criticism impose the necessity of adopting a cautious critical approach, based on an awareness of the limits and possibilities of AI, and affirming the centrality of the critic as the primary agent in the production of meaning. AI, no matter how precise, remains a tool, while literary criticism remains an indispensable human practice.

6. Conclusion

This study has critically demonstrated that the integration of artificial intelligence into literary analysis constitutes not a peripheral methodological shift, but a paradigmatic transformation within contemporary literary theory, particularly in the expanding domain of digital humanities. The findings confirm that AI-driven approaches have introduced new analytical possibilities by enabling the large-scale processing of textual data, facilitating the identification of lexical patterns, stylistic regularities, and latent semantic structures that often remain inaccessible through conventional close reading.

However, the study also underscores a fundamental epistemological tension: while artificial intelligence excels in pattern detection and quantitative abstraction, it remains inherently limited in its capacity to engage with the aesthetic, metaphorical, and context-dependent dimensions that define literariness. Literary meaning, especially within the Arabic tradition, is deeply embedded in rhetorical complexity, cultural memory, and interpretive plurality—dimensions that resist reduction to computational representations. Consequently, any uncritical reliance on algorithmic outputs risks flattening the semantic richness of literary discourse and undermining its hermeneutic depth.

In this context, the research advances a central argument: artificial intelligence should not be conceptualized as a replacement for the literary critic, but rather as a methodological augmentation that expands the scope of analytical inquiry. The empirical findings reinforce the necessity of maintaining the primacy of human interpretation, positioning the critic as a cognitive mediator who contextualizes and interprets computational results within broader cultural and philosophical frameworks.

Accordingly, this study proposes the development of an integrative analytical paradigm that synthesizes distant reading (quantitative, data-driven analysis) with close reading (qualitative, interpretive engagement). Such a hybrid model allows for the exploitation of AI's analytical power while preserving the interpretive sensitivity essential to literary studies. This approach is particularly crucial in the Arabic context, where linguistic complexity, morphological richness, and symbolic density require context-aware and culturally informed analytical strategies.

Furthermore, the research highlights the urgent need for the development of robust Arabic digital corpora, advanced natural language processing tools tailored to the Arabic language, and interdisciplinary collaboration between literary scholars and computational scientists. Without these foundational developments, the full potential of AI in Arabic literary studies cannot be realized.

Ultimately, the study concludes that artificial intelligence represents neither a threat nor a definitive solution to the challenges of literary criticism, but rather a transformative opportunity. When employed critically and responsibly, AI has the potential to redefine the boundaries of literary inquiry, fostering new modes of interpretation and expanding the horizons of literary theory. The future of literary studies, therefore, lies not in the opposition between human and machine, but in their productive convergence, where technological innovation is guided by humanistic insight and interpretive responsibility.

7. Declarations and Statements

Funding Statement

The author received no financial support for the research, authorship, and/or publication of this article.

Conflicts of Interest

The author declares that there are no conflicts of interest regarding the publication of this paper.

Data Availability Statement

The data used in this study consist of selected Arabic literary and critical texts, which are publicly available in published sources. No new datasets were generated. Additional analytical materials may be made available by the author upon reasonable request.

Ethical Approval

This study does not involve human participants, animals, or sensitive personal data. Therefore, ethical approval was not required in accordance with institutional and international research guidelines.

Informed Consent

Not applicable. This research does not involve human subjects.

Consent for Publication

Not applicable.

AI Use Disclosure Statement

This study involves a critical examination of artificial intelligence as a research subject. AI tools were used only as supportive instruments for linguistic and analytical purposes. All interpretations, arguments, and conclusions were developed and verified by the author. The author takes full responsibility for the integrity and originality of the work.

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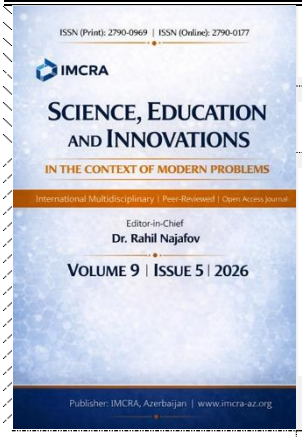
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RESEARCH ARTICLE

Reframing Ethical Governance of Artificial Intelligence in Mental Health Care: Toward a Human-Centered, Explainable, and Clinically Responsible Psychotherapeutic Paradigm

Senoussaoui, Abderrahmen
PhD, Clinical Psychology
University of Mohamed Ben Ahmed Oran 2
Algeria
E-mail: senoussaoui13@gmail.com

Rahmani, Djamel
PhD, School Psychology
Mouloud Mammeri University of Tizi Ouzou
Algeria
E-mail: rahmanidjamel13@gmail.com

Keywords
Artificial Intelligence in Mental Health; Ethical Governance; Psychotherapy and Digital Health; Algorithmic Bias and Fairness; Explainable AI (XAI); Patient Autonomy and Data Privacy; Human–AI Interaction; Digital Phenotyping; Clinical Decision-Making; Ethics of Care Framework

Abstract
The rapid integration of Artificial Intelligence (AI) into Mental Health care represents a transformative shift in the diagnosis, monitoring, and treatment of psychological disorders. While AI-driven tools—including digital phenotyping systems, natural language processing models, and conversational agents—offer significant potential to enhance diagnostic precision, accessibility, and personalized interventions, they simultaneously introduce complex ethical, clinical, and epistemological challenges. This study provides a comprehensive and critical synthesis of contemporary literature (2019–2025) to examine the ethical implications of AI deployment in psychotherapeutic contexts. Moving beyond descriptive review, the paper develops a conceptual ethical governance framework grounded in the principles of autonomy, beneficence, non-maleficence, and justice, as well as the emerging "ethics of care" paradigm. It identifies key risk domains, including algorithmic bias, opacity of decision-making processes, data privacy vulnerabilities, erosion of therapeutic alliance, and the reconfiguration of professional accountability. Furthermore, the study proposes a human-centered, explainable, and clinically supervised AI integration model, emphasizing transparency, continuous ethical auditing, stakeholder inclusion, and hybrid human–AI decision-making structures. The findings highlight that while AI can significantly improve efficiency and expand access to mental healthcare—particularly in resource-constrained settings—its unregulated or poorly designed application may exacerbate inequalities, compromise patient autonomy, and undermine trust in clinical practice. The paper contributes to the interdisciplinary discourse by offering a structured ethical framework that bridges technological innovation with clinical responsibility and humanistic values. It concludes that sustainable and ethically aligned AI integration in mental health requires robust regulatory architectures, cross-disciplinary collaboration, and the preservation of the fundamentally human dimensions of psychotherapy.

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Introduction

Mental disorders represent one of the most critical and rapidly escalating global public health challenges, exerting substantial pressure on healthcare systems, psychiatric institutions, and socio-economic structures worldwide. The growing prevalence of conditions such as depression, anxiety disorders, and behavioral pathologies has been accompanied by a persistent and systemic shortage of qualified mental health professionals, including psychiatrists, clinical psychologists, and psychosocial practitioners. This structural imbalance has resulted in prolonged waiting times for diagnosis and treatment, which not only diminish the overall quality and timeliness of care but also contribute to the deterioration of patients' clinical conditions and long-term health outcomes. Empirical evidence indicates that delayed access to psychological services is strongly associated with worsening symptom severity, particularly in cases of major depressive disorders, thereby reinforcing the urgency of systemic innovation in mental healthcare delivery.

Within this context, the emergence and rapid advancement of Artificial Intelligence (AI) has introduced a transformative paradigm shift in the organization, accessibility, and epistemological foundations of Mental Health services. Positioned at the intersection of computational science and clinical practice, AI-driven technologies—such as machine learning algorithms, natural language processing systems, and digital phenotyping tools—offer unprecedented opportunities to enhance diagnostic precision, enable real-time patient monitoring, and deliver personalized therapeutic interventions at scale. These developments are particularly significant in the context of the Fourth Industrial Revolution, where data-driven decision-making and automation increasingly shape healthcare infrastructures. However, despite these promising advancements, the integration of AI into psychotherapeutic and counseling practices introduces a complex and multidimensional set of ethical, clinical, and epistemological challenges. Core concerns include algorithmic bias and discrimination, risks to patient privacy and data security, lack of transparency in "black-box" decision-making systems, and the potential erosion of the therapeutic alliance—a foundational element of effective psychological treatment. Moreover, the increasing reliance on automated systems raises fundamental questions regarding professional accountability, patient autonomy, and the preservation of inherently human dimensions of care, such as empathy, trust, and interpersonal communication. These issues highlight the tension between technological efficiency and ethical responsibility, necessitating a critical reassessment of existing frameworks governing mental healthcare. While the current body of literature has extensively documented both the opportunities and risks associated with AI in mental health, there remains a notable gap in the development of integrative, human-centered ethical governance models that systematically align technological innovation with clinical responsibility and patient-centered values. In response to this gap, the present study advances a conceptual and analytical framework that reinterprets the ethical governance of AI in psychotherapeutic contexts through the lens of both classical bioethical principles and contemporary relational approaches, including the ethics of care.

Accordingly, this paper aims to (i) critically examine the principal ethical challenges arising from the deployment of AI in mental health diagnosis and therapy, (ii) synthesize existing theoretical and empirical insights into a coherent analytical structure, and (iii) propose a human-centered, transparent, and clinically supervised model for the responsible integration of AI technologies in psychotherapy. By doing so, the study contributes to the evolving interdisciplinary discourse at the intersection of technology, ethics, and mental healthcare, emphasizing that the sustainable future of AI in this domain depends not only on technical sophistication but also on the preservation of fundamental human values and ethical integrity.

Literature Review

The rapid expansion of Artificial Intelligence in Mental Health care has generated a substantial and interdisciplinary body of literature spanning clinical psychology, data science, ethics, and health policy. Existing research can be broadly categorized into three interrelated domains: (i) technological applications of AI in mental healthcare, (ii) ethical and socio-technical challenges, and (iii) emerging governance frameworks.

1. AI Applications in Mental Health Care

A growing number of studies highlight the transformative potential of AI-driven technologies in improving diagnostic accuracy, treatment personalization, and accessibility of care. Machine learning models, natural language processing (NLP), and digital phenotyping have been widely explored as tools for early detection and continuous monitoring of mental disorders (D'Alfonso, 2020; Lee et al., 2022). In particular, conversational agents and AI-supported cognitive behavioral therapy (CBT) systems have demonstrated promising outcomes in reducing symptoms of anxiety and depression while increasing access to psychological support in underserved populations (Beg et al., 2024).

Systematic reviews further confirm that AI applications are increasingly being deployed across diagnostic, predictive, and therapeutic domains, with significant advancements in risk prediction, behavioral pattern recognition, and personalized intervention design (Cruz-Gonzalez et al., 2025). However, despite these advancements, the clinical integration of AI remains uneven and often constrained by data limitations, lack of standardization, and challenges related to interpretability.

2. Ethical and Clinical Challenges

Parallel to technological progress, a substantial body of literature has critically examined the ethical implications of AI in mental healthcare. Core concerns consistently identified across studies include algorithmic bias, data privacy risks, lack of transparency in decision-making, and the erosion of the therapeutic relationship (Fiske et al., 2019; Farmer et al., 2024). These challenges are particularly pronounced in mental health contexts, where data are highly sensitive and clinical decisions rely heavily on subjective and relational dimensions.

Recent empirical and review-based studies emphasize that AI systems may inadvertently reproduce or amplify existing social inequalities due to biased training datasets, leading to disparities in diagnosis and treatment outcomes (Saeidnia et al., 2024). Additionally, the "black-box" nature of many machine learning models raises concerns regarding explainability and accountability, especially in high-stakes clinical decisions.

Furthermore, the integration of AI into psychotherapy introduces complex questions regarding professional roles, responsibility, and patient autonomy. Scholars argue that excessive reliance on automated systems may weaken human-centered care by diminishing empathy, trust, and interpersonal communication—elements that are essential to effective therapeutic engagement (Bloch-Atefi, 2025).

3. Ethical Frameworks and Governance Approaches

In response to these concerns, researchers have proposed various ethical and governance frameworks aimed at guiding the responsible use of AI in healthcare. The foundational principles articulated by Tom L. Beauchamp and James F. Childress—autonomy, beneficence, non-maleficence, and justice—remain central to contemporary discussions, providing a normative basis for evaluating AI applications in clinical settings.

More recent approaches have expanded these principles to address the unique challenges posed by AI systems. For instance, the "ethics of care" framework emphasizes relational responsibility, emotional engagement, and the protection of vulnerable populations, offering a complementary perspective that is particularly relevant in psychotherapeutic contexts (Tavory, 2024). Additionally, global initiatives and interdisciplinary studies advocate for transparency, explainability, fairness, and accountability as key pillars of ethical AI governance (Floridi et al., 2018; Jobin et al., 2019).

Despite these developments, the literature reveals a significant gap in the integration of these ethical principles into coherent, operational frameworks tailored specifically to mental healthcare. Existing studies often remain either highly technical or purely normative, with limited efforts to bridge the gap between ethical theory and clinical implementation.

4. Research Gap and Contribution

While prior research has extensively examined both the opportunities and risks associated with AI in mental health, there remains a lack of integrative, human-centered models that systematically align technological innovation with ethical responsibility and clinical practice. Specifically, the literature lacks comprehensive frameworks that combine ethical principles, practical implementation strategies, and continuous governance mechanisms within psychotherapeutic contexts.

Addressing this gap, the present study contributes by synthesizing existing knowledge into a structured analytical framework and proposing a human-centered, ethically grounded model for the responsible integration of AI in psychotherapy.

Methodology

This study adopts a qualitative, systematic, and integrative review methodology aimed at critically analyzing the ethical implications of AI applications in mental healthcare and developing a conceptual framework for responsible implementation.

1. Research Design

The research is based on a systematic literature review combined with conceptual analysis, enabling a comprehensive synthesis of existing theoretical and empirical studies. This approach is particularly appropriate for examining complex and interdisciplinary topics where empirical data alone are insufficient to capture ethical and conceptual dimensions.

2. Data Sources and Search Strategy

Relevant literature was identified through structured searches in major academic databases, including:

- Scopus
- Web of Science
- PubMed
- PsycINFO

- Google Scholar

The search strategy employed a combination of keywords such as:

- "Artificial Intelligence in Mental Health"
- "AI Ethics in Psychotherapy"
- "Algorithmic Bias in Healthcare"
- "Digital Mental Health"
- "Explainable AI in Clinical Practice"

The search was limited to publications between 2015 and 2025 to ensure the inclusion of the most recent developments, while seminal earlier works were also incorporated where theoretically relevant.

3. Inclusion and Exclusion Criteria

The selection of studies was guided by the following criteria:

Inclusion criteria:

- Peer-reviewed journal articles and high-quality conference papers
- Studies addressing AI applications in mental health or psychotherapy
- Research focusing on ethical, legal, or clinical implications
- Publications in English

Exclusion criteria:

- Studies lacking academic rigor or methodological transparency
- Articles focusing solely on technical AI development without ethical or clinical relevance
- Non-scholarly sources and opinion pieces without empirical or theoretical grounding

4. Data Analysis

The selected literature was analyzed using a thematic and comparative approach, allowing for the identification of key patterns, recurring ethical concerns, and conceptual frameworks. The analysis focused on:

- Types of AI applications in mental healthcare
- Ethical risks and challenges
- Existing governance models and ethical principles
- Gaps between theory and practice

These elements were systematically categorized and synthesized to construct an integrated analytical framework.

5. Development of the Conceptual Framework

Based on the findings of the literature review, the study develops a conceptual model for ethical AI integration in psychotherapy, combining:

- Classical bioethical principles
- Contemporary AI ethics guidelines
- Human-centered design approaches

This framework emphasizes transparency, accountability, human oversight, and continuous ethical evaluation as core components of responsible AI deployment.

6. Limitations

While the study provides a comprehensive synthesis of current knowledge, it is limited by its reliance on secondary data and the absence of primary empirical validation. Future research is encouraged to test the proposed framework through empirical studies, case analyses, and clinical applications.

1. The Use of Artificial Intelligence in Psychotherapeutic Interventions

The use of AI in the humanities and social sciences has given rise to four major concerns, commonly referred to in scientific discourse as the "four horsemen of the AI apocalypse." This metaphor, derived from the Four Horsemen in the Book of Revelation in the Bible—symbolizing war, famine, pestilence, and death—captures a set of existential risks associated with AI development. In the context of AI, these concerns include:

- The displacement of human labor by intelligent systems,
- The potential for machines to make unethical decisions,
- Hostile or adversarial actions against humans led by autonomous systems,
- Opaque and non-interpretable "black box" decision-making processes.

Conversely, many scholars express optimism regarding the transformative potential of AI in mental health, including:

- The development of behavioral digital biomarkers,
- The redefinition of diagnostic frameworks,
- Facilitating early detection of mental disorders,
- The creation of continuous learning systems capable of assessing patients within their real-life contexts,
- Providing tools that enhance understanding of mental illness and human psychology,
- Enabling personalized diagnostic and therapeutic approaches,
- Integrating advanced computational models to improve the safety, efficiency, and personalization of mental healthcare.

This tension between exaggerated fears and ambitious expectations has led to the emergence of the concept of **Artificial Wisdom (AW)**, which represents a forward-looking paradigm. AW seeks to embed AI applications within the human context of the patient, balancing ethical and psychological considerations, thereby making it a safer and more effective tool for supporting mental health (Lee et al., 2022).

Artificial Intelligence encompasses a wide range of technologies that enable computational systems to perform human-like cognitive processes such as learning, reasoning, problem-solving, pattern recognition, generalization, and predictive inference. Broadly speaking, researchers (D'Alfonso, 2020) identify three primary domains for AI applications in mental health:

• Personal Sensing or Digital Phenotyping

Digital phenotyping, also referred to as personal sensing, involves the use of data collected from personal digital devices—particularly smartphones—to gather behavioral and contextual information about individuals. These data are subsequently used as inputs for machine learning methods to predict mental states and psychological outcomes. In addition to smartphones, wearable devices such as smartwatches and activity trackers are also employed.

• Natural Language Processing of Clinical Texts and Social Media Content

The premise that language and vocal expression reflect psychological states has driven advances in natural language processing (NLP) and speech analysis. Clinical interview transcripts serve as traditional sources for mental health-related language analysis, alongside social media content and online forums. These technologies include speech recognition, sentiment analysis, lexical and semantic analysis, and optical character recognition (OCR), all aimed at transforming unstructured text into structured data suitable for further analysis. NLP techniques are particularly relevant to psychiatry, as language and speech constitute primary sources of information in diagnosing and treating mental disorders (Lee et al., 2022, p. 859).

• Chatbots and Virtual Agents

A chatbot is a computer program designed to simulate conversation with users through text or voice interfaces, using either rule-based systems or advanced NLP techniques. The history of chatbots is closely linked to psychology. One of the earliest and most influential systems was ELIZA, which raised important philosophical and psychological questions. ELIZA enabled natural language interaction between humans and computers and was implemented on the MAC time-sharing system at the Massachusetts Institute

of Technology (MIT). It was written in the SLIP programming language within the MAD-SLIP environment for IBM 7091 computers (Weizenbaum, 1966).

Despite the significant advancements of AI in medical diagnosis, its routine adoption in mental health practice remains limited. This delay can be attributed to several factors, including the sensitive nature of data generated through patient-provider interactions—such as clinical notes and therapeutic conversations—as well as the complexity and multidimensionality of diagnostic criteria outlined in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5). These data types and clinical decision-making processes are far more complex than well-defined and objective tasks (e.g., tumor detection from medical imaging), where current AI models have demonstrated strong performance. Furthermore, AI systems are typically "data-hungry," whereas mental health research often faces limited access to large, high-quality, and reliable datasets (Lee et al., 2022).

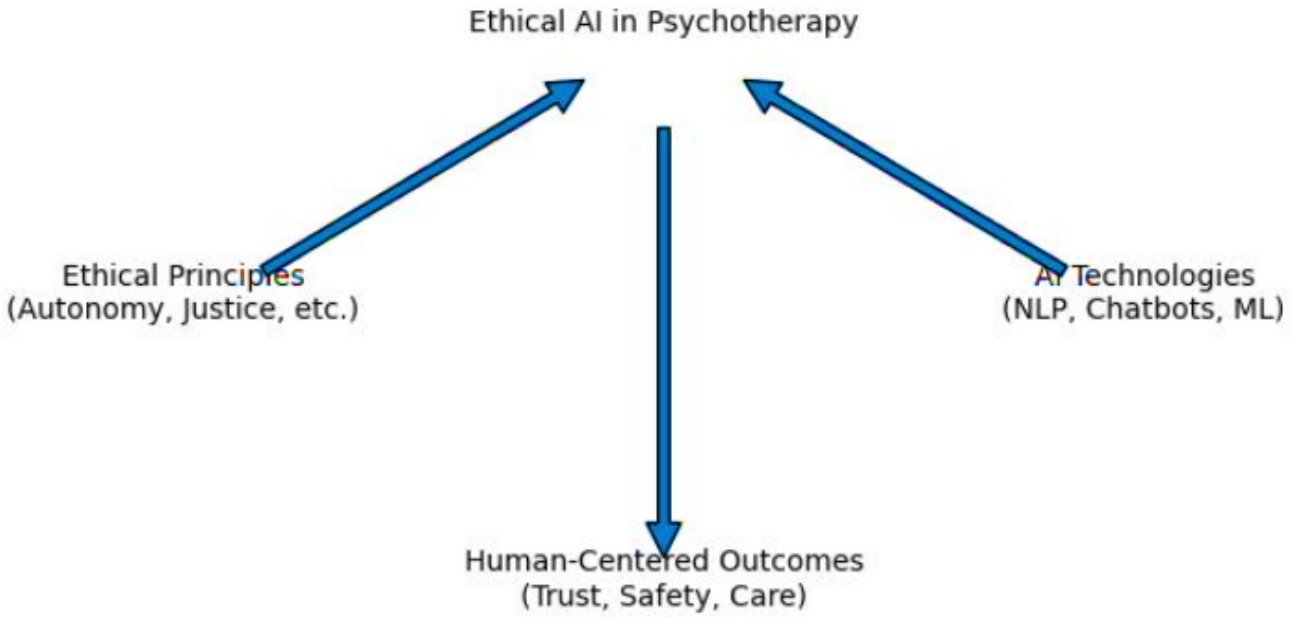

Figure 1. Conceptual Framework for Human-Centered Ethical AI Integration in Psychotherapy (Source: Author's own elaboration based on the literature)

2. Ethical Issues in the Use of AI for Diagnosis, Prediction, and Psychotherapy:

The application of AI in psychotherapy raises a number of complex ethical issues, particularly regarding the need to uphold ethical standards in its use. Numerous scholars have addressed these concerns, proposing frameworks for the ethical deployment of intelligent systems.

Fiske, Henningsen, and Buyx (2019) examined the increasing use of embodied AI applications in mental health fields, including psychiatry, psychology, and psychotherapy. These applications encompass virtual therapists and social robots used in the care of conditions such as dementia, autism, and sexual disorders. While these technologies offer promising therapeutic opportunities—such as improving access to care, enhancing patient engagement, and reducing professional workload—they also introduce significant ethical and societal challenges. These include data protection and security concerns, the absence of robust regulatory and ethical frameworks, the risk of replacing traditional healthcare services, and potential long-term impacts on our understanding of mental illness and human nature.

Warrier et al. (2023) provide a comprehensive overview of ethical challenges in AI-driven mental healthcare, including issues of privacy, informed consent, transparency, and algorithmic bias. The study offers policy recommendations, emphasizing the need for clear and globally applicable ethical guidelines governing the use of AI to enhance mental health outcomes. By balancing innovation with ethical considerations, it is possible to promote the well-being of individuals with mental disorders while safeguarding their privacy, dignity, and equitable access to care. Similarly, Pathak et al. (2024) highlight the importance of addressing ethical concerns such as bias and respect for individual privacy in the integration of AI into mental health services.

Ojo, Yewande (2024) examines ethical challenges associated with AI in psychological diagnosis and treatment planning, concluding that privacy and data protection lie at the core of ethical concerns. Psychological data require stringent safeguards to prevent unauthorized access and misuse, while still enabling responsible data use for AI-driven innovation. The study also emphasizes

fairness, non-discrimination, and the mitigation of racial bias in AI systems, as well as the need for explainability in diagnostic and therapeutic decision-making processes.

Tavory (2024) provides a comprehensive review of ethical challenges in AI-based mental healthcare, arguing that current "responsible AI" approaches are insufficient because they overlook the impact of AI on human relationships and emotional dynamics. She proposes a complementary framework based on the Ethics of Care, which emphasizes responsibility, human interaction, and the protection of vulnerable populations. This approach is particularly relevant for AI systems operating without direct human therapist involvement, ensuring protection against emotional harm, manipulation, and abrupt discontinuation of support.

A systematic review by Saeidnia et al. (2024) identifies eighteen key ethical considerations in AI-based mental healthcare, including privacy, explicit informed consent, bias mitigation, transparency, and autonomy. The study recommends involving patients' families and stakeholders in oversight processes, as well as conducting regular ethical audits and continuous monitoring of AI applications.

Beg et al. (2024), in a review of 28 studies published between 2009 and 2023, highlight the promising potential of AI-supported cognitive behavioral therapy (CBT) applications and conversational agents in alleviating symptoms of anxiety and depression. The study emphasizes the importance of cautious integration, ensuring respect for patient privacy, trust-building, and appropriate regulation of human–machine interactions.

Farmer et al. (2024) critically analyze both the opportunities and ethical/legal considerations of AI in psychological practice. While AI can reduce administrative burdens and improve service delivery, it also poses risks such as bias introduction, erosion of professional skills, and privacy concerns. The authors advocate for balanced and responsible integration, emphasizing continuous evaluation, ethical oversight, and legal compliance.

Cross et al. (2024) conducted two online surveys in Australia to assess AI usage among the general public and mental health professionals. The final sample included 107 community members and 86 professionals. While public attitudes were generally neutral, professionals showed more positive attitudes. AI usage was reported by 28% of community participants—primarily for quick support (60%) or as a personal therapist (47%)—and by 43% of professionals, mainly for research (65%) and report writing (54%). Despite overall positive perceptions of usefulness, many participants reported concerns or harms, including reduced human interaction, ethical issues, privacy risks, medical errors, and data security concerns.

Cruz-Gonzalez et al. (2025), in a systematic review of 85 studies across major databases (CCTR, CINAHL, PsycINFO, PubMed, and Scopus), identify three main domains of AI application in mental health: diagnosis, monitoring, and therapeutic intervention. Their findings indicate increasing use of AI across various disorders, with demonstrated accuracy in detection, classification, risk prediction, and treatment response forecasting. The study recommends future efforts to focus on developing more diverse and robust datasets and enhancing transparency and interpretability to improve clinical practice.

Finally, Bloch-Atefi (2025) highlights the potential of AI in counseling and psychotherapy, particularly in improving efficiency and expanding access to care in underserved areas. AI tools, such as conversational systems, can provide low-cost initial support and help reduce stigma. However, significant ethical challenges remain, including algorithmic bias, privacy violations, and limitations in establishing empathetic and trust-based therapeutic relationships. The study underscores the need to adequately train therapists—both psychologically and technically—and to develop regulatory and ethical frameworks that ensure safe, equitable, and human-centered use of AI technologies.

3. Ethical Considerations in the Use of Artificial Intelligence in Healthcare and Mental Health:

Beauchamp and Childress (2001) proposed a coherent and widely accepted ethical framework for addressing issues in healthcare, consisting of four fundamental principles that guide ethical decision-making in medical and research contexts. These principles provide a crucial foundation for analyzing the ethical dimensions of AI applications in mental health:

1. Respect for Autonomy (Beauchamp & Childress, 2001, p. 57)

This principle refers to patients' right to make informed decisions regarding their healthcare. In the context of AI, it raises several considerations, including:

- Informed consent,
- Privacy and data control,
- Shared decision-making between the patient, the system, and/or the clinician.

2. Non-maleficence (Beauchamp & Childress, 2001, p. 113)

This principle emphasizes the obligation to avoid harm, which is particularly critical in AI-supported mental healthcare. It entails:

- Minimizing potential errors,
- Addressing bias in datasets and models,
- Ensuring data protection and security.

3. Beneficence (Beauchamp & Childress, 2001, p. 165)

This principle involves actively promoting patients' well-being. In AI-based mental health applications, it includes:

- Improving quality of care,
- Expanding access to services,
- Continuous improvement of tools and interventions.

4. Justice (Beauchamp & Childress, 2001, p. 225)

This principle concerns the fair distribution of benefits and burdens. In AI contexts, it includes:

- Ensuring equitable access to services,
- Promoting algorithmic fairness.

Building on these principles, Tavory (2024) advances the **Ethics of Care** as an alternative ethical framework to traditional models grounded in responsibility or regulatory compliance. This approach is particularly relevant to AI in mental health, as it emphasizes human relationships, emotional engagement, and shared responsibility—making it well-suited to addressing the unique ethical challenges posed by AI in psychotherapy. Tavory (2024, p. 8) proposes three main domains of application:

First: Ethics of Care in the Development Phase of AI-Based Psychotherapeutic Technologies

In the absence of formal regulatory standards, it is essential to ensure the clinical validation of AI tools to confirm their safety and effectiveness. Involving patients and users in the design process is crucial for accurately understanding their psychological and social needs, alongside engaging key stakeholders such as healthcare teams and patients' families. Cultural diversity must also be carefully considered through comprehensive mapping of local communities and socio-cultural contexts.

Additionally, it is important to identify vulnerable populations and propose appropriate technological solutions tailored to their needs, recognizing that vulnerability is an inherent aspect of the human condition that may emerge at different life stages. This necessitates clear safeguards to ensure appropriate handling. Proactive mechanisms should also be developed to detect and mitigate risk factors, while integrating features that support human interaction within therapeutic system design and allow for human intervention when necessary.

Furthermore, clear strategies should be established for updating or discontinuing therapeutic AI systems (e.g., chatbots or robots), taking into account the potential psychological and emotional impacts on users.

Second: Emotional Considerations in the Use of AI in Mental Healthcare

Respect for human dignity constitutes the ethical foundation of all design and implementation processes involving intelligent systems, particularly in therapeutic contexts. It is essential to avoid exploiting users' trust or their desire for interaction, and to prevent any form of emotional manipulation.

Emotional expressions should not be treated as reliable predictors of future psychological states, requiring caution in interpretation. Emotional biases—whether affecting individuals or therapeutic relationships—must also be considered, especially given the lack of universal consensus on the definition and expression of emotions.

Moreover, cultural diversity in emotional expression and interpersonal relationships should be taken into account to ensure respectful, inclusive, and equitable interactions across different cultural backgrounds.

Third: Ethical Considerations in Using Intelligent Systems to Meet Users' Psychological Needs

Developers of AI systems in mental healthcare must commit to promoting patient well-being and supporting the therapeutic relationship where applicable, ensuring that the intended use of technology aligns with these goals. User feedback and system responses should be managed in ways that ensure actual needs are being met.

This also requires the establishment of appropriate professional and ethical policies, including risk management mechanisms—particularly for handling emergency situations requiring human intervention. Ensuring the accuracy of information and grounding it in reliable scientific sources is equally critical to prevent misinformation.

Regarding privacy, policies should go beyond minimum legal requirements by avoiding the storage of personally identifiable information whenever possible, and ensuring that such data remain confined within user-controlled applications. Data should not be shared with third parties unless legally required, and explicit, transparent user consent must always be obtained.

OjoYewande (2024) further emphasizes the need to reconsider professional ethics and responsibilities in light of the expanding role of AI in diagnosis and treatment. It is essential to clearly define the boundaries of professional judgment and legal accountability for harms that may arise from AI systems. Broader societal implications—including shifts in public perceptions of mental healthcare and transformations in the healthcare workforce—also warrant in-depth analysis.

Table 1. Ethical Risks and Governance Strategies in AI-Driven Mental Health Care

Ethical Dimension	Key Risks in AI Applications	Clinical Implications	Proposed Governance Strategies
Algorithmic Bias and Fairness	Biased training data leading to unequal diagnostic outcomes across populations	Misdiagnosis, unequal treatment recommendations, health disparities	Use diverse and representative datasets; implement bias detection and mitigation protocols; conduct regular algorithmic audits
Data Privacy and Confidentiality	Unauthorized access, data breaches, and misuse of sensitive psychological data	Loss of patient trust, legal violations, psychological harm	Apply strong encryption methods; ensure compliance with data protection regulations; adopt privacy-by-design principles
Transparency and Explainability	"Black-box" decision-making processes lacking interpretability	Reduced clinician trust, inability to justify clinical decisions	Integrate Explainable AI (XAI) models; provide interpretable outputs; ensure clinician understanding of AI recommendations
Patient Autonomy	Limited informed consent and lack of control over AI-driven decisions	Reduced patient agency and ethical violations	Implement transparent consent mechanisms; enable shared decision-making between patient, clinician, and AI system
Therapeutic Alliance	Reduced human interaction due to overreliance on AI systems	Weakening of empathy, trust, and interpersonal communication	Maintain human-in-the-loop models; ensure AI complements rather than replaces clinicians
Accountability and Responsibility	Unclear responsibility for AI-related errors or harm	Legal ambiguity and ethical uncertainty	Define clear accountability frameworks; establish regulatory oversight and clinical governance structures
Safety and Reliability	Inaccurate predictions or system failures	Clinical risks and potential harm to patients	Conduct clinical validation studies; implement continuous monitoring and evaluation systems

Table 2. Conceptual Framework for Human-Centered Ethical AI Integration in Psychotherapy

Framework Component	Description	Operational Mechanisms	Expected Outcomes
Ethical Foundations	Integration of core bioethical principles (autonomy, beneficence, non-maleficence, justice) with ethics of care	Ethical guidelines embedded in system design; interdisciplinary ethical review processes	Alignment of AI systems with human values and clinical ethics
Data Governance	Responsible collection, storage, and use of mental health data	Data anonymization, encryption, and user-controlled data access	Protection of patient privacy and data security

Algorithmic Transparency	Ensuring interpretability and explainability of AI models	Adoption of Explainable AI (XAI) techniques; transparent reporting of model decisions	Increased clinician trust and improved decision-making
Human–AI Collaboration	Hybrid model combining AI efficiency with human clinical judgment	Human-in-the-loop systems; clinician supervision of AI outputs	Enhanced accuracy while preserving human oversight
Continuous Ethical Auditing	Ongoing evaluation of AI systems for ethical compliance	Periodic audits, bias detection tools, and stakeholder feedback mechanisms	Early detection of risks and sustained ethical alignment
Stakeholder Engagement	Inclusion of patients, clinicians, and policymakers in AI development	Participatory design approaches; user-centered system testing	Improved usability, acceptance, and contextual relevance
Regulatory and Legal Frameworks	Establishment of clear policies governing AI use in healthcare	Development of adaptive regulations; compliance with international standards	Legal clarity, accountability, and safe deployment of AI systems

Regulatory frameworks and governance mechanisms play a critical role in addressing these challenges. Policymakers face the complex task of developing flexible regulations that foster innovation while ensuring robust ethical safeguards. This requires a collaborative, interdisciplinary approach involving clinicians, psychologists, ethicists, researchers, engineers, and AI developers.

AI has the potential to transform mental healthcare by improving diagnostic accuracy, enabling personalized treatment, and enhancing therapeutic outcomes. It also contributes to increased efficiency, affordability, and accessibility of care. Tools such as chatbots, virtual therapists, and predictive algorithms are already emerging. However, ethical guidelines and responsible practices remain essential to ensure that AI contributes positively to the well-being of individuals with mental disorders (Warrier, Warrier, &Khandelwal, 2023).

Proposed Ethical Considerations for Future AI-Based Psychotherapy Applications:

1. Algorithmic bias represents a major concern in the diagnosis and treatment of mental disorders. AI systems rely on large datasets that may contain inherent biases, leading to disparities in diagnosis and treatment recommendations, particularly affecting marginalized populations.

2. Privacy and data protection are among the most critical ethical challenges in AI-driven mental healthcare. These include risks of unauthorized access, data breaches, and the commercial exploitation of patient information, necessitating strict protective measures.

3. Maintaining ethical standards in AI-based mental healthcare is essential. The opacity of AI systems may hinder understanding of decision-making processes. Responsible use requires explainability, as well as accountability for outcomes, particularly in cases of errors or harm.

4. Transformation of the therapeutic relationship: The integration of AI may alter traditional therapist–patient dynamics by introducing advanced technological tools. Achieving a balanced integration between AI support and professional expertise remains a complex and evolving ethical challenge.

5. Explicit informed consent is a cornerstone of medical ethics. Patients must retain the right to make fully informed decisions and to refuse AI-based interventions if they have reservations.

A comprehensive study by Saeidnia et al. (2024), based on a systematic review of literature from major databases (PubMed, PsycINFO, Web of Science, and Scopus) covering the period 2014–2024, analyzed 51 relevant articles and identified 18 key ethical considerations, categorized as follows:

1. Six ethical considerations in AI-based mental health interventions:

- Privacy and confidentiality
- Informed consent
- Bias and fairness

- Transparency and accountability
- Autonomy and human agency
- Safety and effectiveness

2. Five ethical principles for development and implementation:

- Ethical frameworks
- Stakeholder engagement
- Ethical review
- Bias mitigation
- Continuous evaluation and improvement

3. Seven best practices and recommendations:

- Adherence to ethical guidelines
- Ensuring transparency
- Prioritizing data privacy and security
- Mitigating bias and ensuring fairness
- Stakeholder involvement
- Regular ethical audits
- Monitoring and evaluating outcomes

This systematic review underscores the importance of embedding ethical considerations into the responsible implementation of AI technologies in mental healthcare, ensuring the protection of individuals' dignity and the achievement of equitable and sustainable therapeutic outcomes.

Conclusion:

The integration of Artificial Intelligence into Mental Health care represents a paradigmatic transformation in the delivery, accessibility, and personalization of psychotherapeutic services. However, as this study has demonstrated, the expansion of AI-driven applications in psychotherapy cannot be understood solely through the lens of technological advancement; rather, it must be critically evaluated within a robust ethical, clinical, and regulatory framework that safeguards fundamental human values. The findings underscore that without the systematic incorporation of ethical governance mechanisms, AI technologies risk reinforcing existing inequalities, compromising patient autonomy, and undermining the therapeutic alliance that constitutes the foundation of effective mental health care.

This paper contributes to the emerging interdisciplinary discourse by advancing a human-centered and ethically grounded perspective on AI integration, emphasizing the necessity of aligning algorithmic efficiency with principles of autonomy, beneficence, non-maleficence, and justice, alongside relational approaches such as the ethics of care. In this regard, AI should not be conceptualized as a substitute for human clinicians, but rather as a complementary and augmentative tool operating within a hybrid decision-making ecosystem that preserves professional accountability and human oversight.

Despite recent efforts by certain national and international actors to establish preliminary regulatory responses, the current global landscape remains characterized by significant fragmentation and the absence of comprehensive legal frameworks governing AI in healthcare. This regulatory asymmetry creates a critical gap between technological innovation and institutional readiness, thereby exposing patients and practitioners to ethical, legal, and operational risks. Addressing this gap requires the development of adaptive, transparent, and enforceable governance architectures capable of responding to the dynamic nature of AI systems.

Accordingly, future progress in this domain depends on sustained interdisciplinary collaboration among AI developers, clinicians, ethicists, legal scholars, and policymakers. Such collaboration is essential for designing clinically validated, ethically aligned, and socially responsible AI systems that are responsive to diverse cultural and contextual realities. Furthermore, continuous ethical auditing, stakeholder engagement, and the integration of explainable AI principles are necessary to ensure accountability and trust in AI-assisted mental healthcare. In conclusion, the responsible and sustainable deployment of AI in psychotherapy necessitates a shift from purely innovation-driven approaches toward ethically informed and human-centered paradigms. Only through the

establishment of comprehensive regulatory frameworks, the reinforcement of professional oversight, and the preservation of the intrinsically human dimensions of care—such as empathy, trust, and relational engagement—can AI fulfill its potential as a transformative yet ethically responsible force in the future of mental health care.

Declarations

Ethics Approval and Consent to Participate. This study is based exclusively on previously published literature and does not involve human participants, animals, or primary data collection. Therefore, ethical approval and informed consent were not required in accordance with institutional and international research ethics guidelines.

Consent for Publication. Not applicable. This manuscript does not contain any individual person's data in any form.

Availability of Data and Materials. All data supporting the findings of this study are derived from publicly available sources cited within the reference list. No new datasets were generated or analyzed during the current study.

Conflict of Interest Statement. The authors declare that they have no competing interests, financial or non-financial, that could have influenced the work reported in this paper.

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Authors' Contributions

- Senoussaoui, Abderrahmen: Conceptualization, literature review, methodology design, writing – original draft, and theoretical framework development.
- Rahmani, Djamel: Supervision, validation, critical revision of the manuscript, and contribution to ethical analysis and interpretation.

All authors have read and approved the final manuscript.

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Ethical Considerations. This study adheres to internationally recognized ethical standards in research and publication. The analysis was conducted in accordance with the ethical principles of Tom L. Beauchamp and James F. Childress, including respect for autonomy, beneficence, non-maleficence, and justice. Special attention was given to issues related to data privacy, algorithmic bias, transparency, and the preservation of human dignity in the context of Artificial Intelligence applications in Mental Health care.

AI Use Disclosure Statement. The authors confirm that no generative artificial intelligence tools were used in the creation, analysis, or writing of this manuscript in a manner that replaces human intellectual contribution. Any use of digital tools was limited to language editing and formatting assistance, under full human supervision.

Data Privacy Statement. This study does not involve the collection, processing, or storage of personal data. All referenced materials are publicly available and used in accordance with academic and ethical standards.

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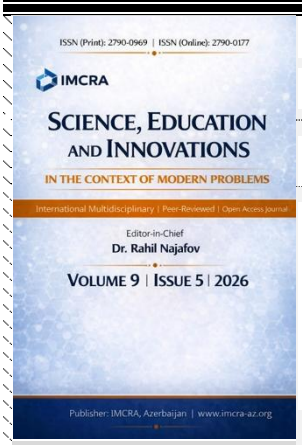
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RESEARCH ARTICLE

Curricular Reform for Primary Teacher Education in the AI Era in Albania: Challenges and Perspectives from the Estonian Model

Enida Kume

Assoc. Prof. Dr.
Faculty of Education, "Aleksander Moisiu" University, Durres
Albania
E-mail: enidak@hotmail.it; ORCiD: https://orcid.org/0000-0002-3187-0418

Keywords Curricular Reform, Bachelor, Primary Education, Artificial Intelligence, Computational Thinking, Estonian Model.

Abstract

The rapid advancement of Artificial Intelligence (AI) and Information Technology (IT) has necessitated a radical transformation in initial teacher education. This paper examines the necessity of doctoral-level curricular reform in Bachelor programs for primary education in Albania, aiming to prepare pre-service teachers for effective teaching in the digital era. Utilizing a hybrid methodology that combines documentary analysis of current syllabi with a comparative benchmarking against the Estonian "ProgeTiiger" model, the study identifies significant gaps in existing Albanian curricula. Results indicate that technology in our universities remains isolated as a technical subject, bypassing transversal integration and AI competencies. In contrast, the Estonian model demonstrates that success lies in the application of the Technological Pedagogical Content Knowledge (TPACK) framework and the development of Computational Thinking from the earliest stages of study. The paper proposes a new curricular structure based on four pillars: integrating AI for personalized learning, coding and robotics as cognitive tools, data ethics, and digital safety. We conclude that the reform must shift the focus from the teacher as a tool user to the teacher as an architect of interactive learning environments. This transformation is a sine qua non to ensure that future teachers are capable of leading "digital natives" toward sustainable academic success.

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1. Introduction

In recent decades, the rapid advancement of technology has fundamentally transformed the paradigms of learning and teaching processes. Students in the lower elementary cycle, who are at a critical stage of cognitive and social development, require teachers capable not only of transmitting foundational knowledge but also of employing innovative methods and technologies that enhance engagement and conceptual understanding. Information Technology (IT) and Artificial Intelligence (AI) hold significant potential to personalize learning, monitor individual progress, and provide interactive tools that render the educational process more efficient and appealing to children.

However, to leverage these opportunities, it is essential that the Bachelor of Education curricula for primary school teachers be adapted and reformed. Currently, while many university programs offer a robust pedagogical and methodical foundation, they

often lack in-depth and structured training regarding the application of IT and AI in teaching. Consequently, graduates complete their studies without the practical digital skills necessary to effectively integrate technology into lower elementary classrooms.

Curricular changes must aim to develop students' digital competencies, including the utilization of educational platforms, the creation of interactive learning environments, and the exploitation of AI for analyzing student progress. Beyond technical proficiency, it is imperative that students acquire the pedagogical skills to adapt instruction based on children's individual needs and to utilize technology in an ethical and secure manner.

This focus is particularly vital for the lower elementary cycle, where the foundations of learning are established and where the use of digital tools can profoundly influence students' motivation, engagement, and academic success. Therefore, curricular reform is a necessity to empower future teachers, ensuring they are prepared to construct a modern, effective learning environment tailored to the needs of lower elementary students.

2. Literature Review

Scientific literature emphasizes the TPACK (Technological Pedagogical Content Knowledge) model, developed by Mishra and Koehler (2006), as the primary framework for reforming Bachelor curricula. According to recent studies, simply adding computer science courses to the curriculum is insufficient; reform must target the intersection of pedagogical and technological knowledge. Schmidt et al. (2009) argue that Bachelor programs for primary school teachers should model the use of technology within methodological courses (such as language or mathematics methods) rather than as isolated technical modules.

Research by Wing (2006), followed by the studies of Barr and Stephenson (2011), underscores that elementary school teachers must be prepared to integrate "Computational Thinking" from the earliest stages of schooling. Recent publications suggest that university curricula should train future teachers on how to decompose complex problems into simple algorithms—a skill that precedes programming and advanced AI utilization. Yadav et al. (2017) observe that successful integration depends directly on the exposure of Bachelor students to these concepts during their initial training.

With the emergence of generative AI, scientific literature (Luckin, 2023; Holmes et al., 2022) has begun to examine the need for "AI Literacy" for teachers. Research suggests that the Bachelor curriculum should include modules addressing:

-*Personalization of Learning*: How AI can assist primary school teachers in creating differentiated materials for students with diverse cognitive levels.

-*AI Ethics:* Studies by Zhai et al. (2021) emphasize that future teachers must understand algorithmic biases and children's data privacy, making ethics an integral part of curricular reform.

Comparative studies, such as Tondeur et al. (2012), indicate the existence of a "digital gap" between what students learn at the university level and the reality of primary classrooms. Many authors propose that curricular reform should shift from a "computer use" model toward the SAMR model (Puentedura, 2010), where technology and AI are utilized to completely redefine learning tasks, enabling activities that were previously inconceivable in the elementary cycle.

3. Methodology

This study adopts a Mixed Methods Research approach, integrating qualitative documentary analysis with comparative benchmarking to provide a comprehensive framework for the proposed curricular reform. The methodology is designed to transition from identifying existing systemic gaps at the national level toward modeling a contemporary curricular structure that aligns with the dynamic advancements in Artificial Intelligence (AI) and Information Technology (IT).

3.1. Documentary Analysis and Benchmarking

The initial phase of the research focuses on Content Analysis of current syllabi and academic curricula across major universities in Albania. This technique examines the degree of digital competency integration by using key indicators such as "algorithmic thinking," "generative AI," and "data ethics." To ensure objectivity and rigor, this analysis is enriched by horizontal and vertical benchmarking. The horizontal analysis compares programs within the country to identify internal consistency, while the vertical analysis contrasts the Albanian national curriculum with the Estonian "ProgeTiiger" model. Estonia was selected as a primary case study due to its global leadership in digital education, serving as a gold standard for integrating high-level technology into initial teacher training.

3.2. Analytical Framework: TPACK and DigCompEdu

To evaluate the quality of teacher preparation, the study utilizes the TPACK (Technological Pedagogical Content Knowledge) theoretical framework. This model allows for the identification of the intersection between pedagogical and technological knowledge, verifying whether technology is treated as an isolated tool or as an organic component of subject-specific

methodologies. Concurrently, the competency assessment is guided by the European DigCompEdu framework, which serves as a standardized instrument to define the six essential areas of digital competence required for an educator in the AI era.

3.3. Curricular Design Instruments and Procedures

The design of the new course structure follows the principles of Competency-Based Curriculum Design. This methodology emphasizes a shift from static descriptions of course content toward the formulation of learning outcomes that demonstrate practical proficiency in AI utilization. To validate the proposed reform, the Delphi Method is employed, involving a panel of experts in education, IT, and developmental psychology who review the structure for feasibility and academic rigor.

Furthermore, the study incorporates a Needs Assessment through focus groups with pre-service teachers and school mentors. This ensures that the reform is grounded in empirical data regarding the actual challenges faced in primary school classrooms when implementing technology. Finally, the methodology proposes the application of a Spiral Curriculum Model, where AI concepts and Computational Thinking are introduced progressively throughout the three years of Bachelor studies. This methodological approach ensures that the reform transcends simple nomenclature changes, establishing a science-based process that guarantees the sustainability and efficacy of future teacher preparation.

4. Results

4.1. Results from the Analysis of Current Curricula in Albania

The analysis of syllabi and curricular structures reveals that the preparation of future primary school teachers is conducted in accordance with a traditional approach to Information and Communication Technology (ICT), which is characterized by and results in the following:

Superficial and Non-Integrated Treatment of Technological Knowledge

Current curricula treat IT as an independent discipline, usually in the first year of study, through courses such as "Applied Informatics" or "Basics of ICT." These modules focus primarily on automating office tasks, such as word processing, spreadsheet design, and basic internet usage. The results indicate a problematic lack of interdisciplinary integration. Digital tools are perceived as administrative instruments for the teacher rather than pedagogical levers to stimulate student learning.

The Artificial Intelligence "Vacuum"

Although AI has transformed the global educational landscape, analyses show that this term does not appear in any of the Bachelor programs in Albania. There are no modules addressing generative AI or adaptive learning systems. This absence leaves pre-service teachers unprepared to manage the use of these tools by students or to utilize them for personalizing instruction, creating a significant gap between academic competence and the technological reality of the classroom.

Absence of Computational Thinking

Bachelor degree curricula do not provide for the development of algorithmic skills in future teachers. Unlike international practices—where primary school teachers are trained to decompose problems, identify patterns, and understand coding logic (including unplugged coding)—the focus in Albania remains on consumption and the utilization of digital product features rather than their creation. This hinders the preparation of teachers to develop the analytical skills in children necessary for the 21st century.

Neglect of Ethics and Digital Safety

Although internet safety is frequently mentioned as a necessary condition, it is not treated as a pedagogical competency. Observation results show that future teachers do not acquire structured knowledge regarding data ethics, the privacy of minors in AI environments, or how to address algorithmic biases.

The analysis of current curricula implemented in first-cycle Bachelor teaching programs in Albanian higher education highlights the existence of a "competency fragmentation" phenomenon. There is a misalignment between training objectives and the requirements for a teacher who must operate in a technology-enriched environment. This "curricular sclerosis" demands an urgent intervention, where technology and AI cease to be "supplementary" subjects and instead become the backbone of teaching methodologies, ensuring that the new teacher is not merely a user, but an architect of modern learning environments.

4.2 Comparative Analysis: Albania vs. Estonia (The "ProgeTiiger" Model)

The comparative analysis between the educational preparation systems in Albania and Estonia provides a clear insight into the existing asymmetry regarding the integration of technology and Artificial Intelligence (AI) in Bachelor of Education programs. Estonia, considered a global pioneer in the digital transformation of education, utilizes the "ProgeTiiger" model as a referential

framework that begins as early as preschool and extends to the academic preparation of teachers. This comparison highlights the need for a radical reconceptualization of the Albanian paradigm, moving from technical literacy toward a sophisticated digital culture.

Firstly, the fundamental difference lies in the philosophy of curricular integration. In Albanian universities, as evidenced in the previous analysis, technology is treated as an external and isolated entity. In contrast, the Estonian model is based on the principle of "transversality." Bachelor programs in Estonia do not view technology as a standalone subject, but as a tool present in every subject-specific methodology. Estonian students preparing for primary education are trained from the beginning on how to integrate robotics, coding, and AI tools within subjects such as native language, mathematics, and natural sciences. While in Albania the focus remains on theoretical knowledge of hardware and basic software packages, in Estonia, the priority is the use of these tools to solve complex pedagogical problems.

Secondly, the success of the "ProgeTiiger" model is based on the early development of Computational Thinking (CT). Comparison results show that future teachers in Estonia are equipped with the skills to design simple algorithms and understand programming logic starting from the first year of their Bachelor studies. This allows them to teach children aged 6–11 not only how to use a tablet, but how to understand the logic behind an application or an AI tool. In Albania, this dimension is almost entirely absent from primary education Bachelor curricula, creating a teacher who is primarily a passive consumer of technology, incapable of leading students toward digital creativity.

Thirdly, regarding Artificial Intelligence and Robotics, Estonia has implemented dedicated modules for pedagogical AI. Bachelor students are trained to evaluate the ethics of algorithms and to use adaptive tools that adjust task difficulty based on the individual progress of the student. The comparison results reveal that while Estonian teachers are prepared to be "orchestrators" of an AI-enriched environment, teachers in Albania often view technology with skepticism or as a tool that might replace their authority due to a lack of knowledge regarding the functioning of these systems.

Another critical point of comparison is the supporting infrastructure and industry partnerships. The "ProgeTiiger" model is funded and supported by a wide network of public and private institutions, ensuring that universities have access to the latest technologies. In Albania, curricular reform is often hindered by the lack of functional laboratories and delays in updating syllabi, which fail to reflect the pace of development in the technology industry.

Finally, the assessment of digital competence in Estonia is carried out through clear and measurable standards (such as the DigCompEdu framework), where teacher graduation is contingent upon demonstrating practical skills in technology integration. In Albania, assessment remains primarily theoretical and based on classical examinations, without a strong component for evaluating digital performance during pedagogical practice.

In conclusion, the comparative analysis confirms that Estonia has succeeded in building an ecosystem where technology and AI are organic parts of the teacher's professional identity. For Albania, following the Estonian model does not mean a mechanical copying of curricula, but the adoption of the principle that technology is not a subject to be learned, but a new language through which the entire educational process occurs. The reform in the Bachelor cycle should aim for precisely this transformation: from a teacher who explains technology to a teacher who transforms learning through it.

5. Discussion: Toward an Integrative Curricular Reform

The results of the study prove that curricular reform cannot remain a superficial process of updating syllabi but must aim for an ontological transformation of professional teacher training. One of the primary pathways identified is the definitive shift from technology as a "peripheral subject" toward technology as a "pedagogical lever." According to Chai et al. (2013), the preparation of primary cycle teachers in the last decade has demonstrated that teaching effectiveness depends on mastering the TPACK (Technological Pedagogical Content Knowledge) framework. In the Albanian context, this implies that methodological subjects (Language Methodology, Mathematics, etc.) must include modules where technology and AI are used to explain specific subject concepts. This argument is supported by Tondeur et al. (2012), who emphasize that student-teachers gain digital competence only when they see their instructors modeling the use of technology within academic disciplines, rather than as isolated technical training.

A critical instrument that must be included in the Bachelor reform is the development of Computational Thinking (CT). As evidenced by the success of the "ProgeTiiger" model in Estonia, CT should not be confused with pure programming. Yadav et al. (2017) argue that CT is a cognitive process involving problem decomposition and algorithm design—skills that are essential for elementary cycle teachers. The reform should integrate CT as a "second language" in the curriculum, preparing teachers to use educational robotics and logic games as tools for students' cognitive development. This instrument would serve as a bridge between technological abstraction and concrete classroom practice.

Furthermore, the integration of Artificial Intelligence presents a new challenge requiring specific instruments for AI Literacy. Recent publications by Luckin (2023) and Holmes et al. (2022) point out that future teachers must be capable of acting as "data interpreters." In our discussion, this translates to the need for the Bachelor curriculum to contain modules on AI ethics, the data security of minor students, and the management of adaptive learning systems. The instrument of digital ethics should no longer be an optional addition but a pillar of professional integrity. The new teacher must have the critical ability to identify algorithmic biases before introducing AI tools in a school environment.

Another important dimension of the discussion relates to the instrument of "in-situ" pedagogical practice. The identified gap between university theory and the reality of primary schools suggests that the reform must reconceptualize student mentoring. According to Koehler et al. (2014), practical experience is decisive in shaping a teacher's pedagogical beliefs. Therefore, the reform should make graduation conditional upon demonstrating digital competence during practicum hours, where the student is evaluated not only on traditional methods but also on the ability to orchestrate a technology-enriched learning environment.

It is important to emphasize that the standardization of competencies is an indispensable instrument for measuring the success of the reform. The adoption of the European DigCompEdu framework would serve as a compass for Albanian universities, ensuring that future teachers master all six areas of digital competence: from professional engagement to learner empowerment. This standardization would also facilitate international cooperation and academic mobility, aligning Albania with successful models like that of Estonia.

The above analysis shows that the success of curricular reform in Bachelor programs depends on the synchronization of three factors: (i) the political vision for digital transformation, (ii) the updating of university laboratories and infrastructure, and (iii) the retraining of academic staff to model new methods. Without such a multidimensional intervention, there is a risk that future teachers will remain "visitors" in a modern classroom where their students are already "digital natives." The reform should aim to produce a teacher who is not merely a transmitter of technical knowledge, but an architect of learning experiences guided by pedagogy and empowered by Artificial Intelligence.

6. Curricular Reform Expectations

The expected outcomes from the implementation of curricular reform in Bachelor programs for primary education are anticipated to be transformative. Its impact should be evident in professional preparation, pedagogical efficiency, and an ethical approach to technology. This process aims to produce a new generation of teachers who are not merely users of Information Technology, but architects of learning environments empowered by Artificial Intelligence (AI).

Table 1. A Comprehensive Comparative Analysis of Curricular Structures, Pedagogical Approaches, and AI Integration in Primary Teacher Education

Dimension	Albania (Current Model)	Estonia (ProgeTiiger Model)	Identified Gap	Strategic Reform Direction
Curricular Philosophy	Technology treated as a standalone subject, primarily focused on basic ICT literacy	Technology embedded transversally across all disciplines as a pedagogical tool	Fragmented and non-integrated curriculum	Transition toward a transversal and integrated digital curriculum
Role of Technology in Teaching	Administrative and supportive (e.g., Word, Excel, presentations)	Transformative and cognitive (problem-solving, modeling, simulation)	Limited pedagogical use of technology	Redefine technology as a pedagogical driver of learning innovation
Artificial Intelligence (AI) Integration	Completely absent from curricula	Integrated into pedagogical training, including adaptive learning systems	AI competency gap	Introduce AI literacy modules and practical applications
Computational Thinking (CT)	Not included in teacher training programs	Introduced from early stages; includes algorithmic thinking and basic coding	Lack of analytical and problem-solving training	Embed CT as a core competency across curriculum

Pedagogical Framework	Predominantly traditional teaching models	TPACK and SAMR frameworks actively applied	Weak connection between pedagogy and technology	Adopt TPACK-based instructional design models
Teacher Role Conceptualization	Teacher as knowledge transmitter and tool user	Teacher as learning architect and digital facilitator	Outdated professional identity	Reconstruct teacher identity as designer of AI-enhanced learning environments
Assessment Methods	Theoretical exams with minimal digital evaluation	Performance-based assessment using digital portfolios and real tasks	Lack of practical competence evaluation	Implement digital performance-based assessment systems
Ethics and Digital Safety	Mentioned superficially, not structured	Core component (data privacy, algorithmic bias, digital responsibility)	Ethical awareness gap	Integrate AI ethics and digital safety as mandatory modules
Infrastructure and Resources	Limited access to modern labs and digital tools	Strong institutional and governmental support with advanced labs	Technological infrastructure deficit	Invest in pedagogical innovation labs and digital ecosystems
Industry and Institutional Collaboration	Weak collaboration between universities and external stakeholders	Strong partnerships with tech industry and government programs	Lack of ecosystem integration	Develop multi-stakeholder partnerships (universities–schools–industry)
Teacher Training Approach	Static curriculum, infrequent updates	Dynamic, continuously evolving curriculum aligned with tech trends	Lack of adaptability	Establish continuous curriculum innovation cycles
Student Preparedness	Graduates lack practical digital and AI competencies	Graduates demonstrate applied digital and AI teaching skills	Skills mismatch with classroom reality	Align training with 21st-century classroom requirements
International Alignment	Limited alignment with European standards	Fully aligned with DigCompEdu and EU digital education policies	Weak international compatibility	Adopt European frameworks (DigCompEdu)
Pedagogical Practice (Practicum)	Traditional classroom observation and teaching	Technology-integrated practicum with real digital tools	Theory-practice gap	Introduce technology-rich practicum environments
Innovation Capacity	Low level of pedagogical innovation	High level of innovation through experimentation and digital tools	Innovation deficit	Foster innovation-oriented teaching culture

Source: Developed by the author based on comparative analysis of Albanian curricula and the Estonian ProgeTiiger model (2026).

The primary expected result involves the enhancement of Technological Pedagogical Content Knowledge (TPACK). Graduates will demonstrate the ability to organically integrate AI and IT tools within subject methodologies. It is expected that future teachers will shift from the simple use of digital tools toward modeling scenarios where AI serves to personalize learning, adapting didactic materials according to the pace and cognitive needs of each student.

The reform must achieve the development of Computational Thinking as a core skill. Teachers will be capable of fostering algorithmic logic and problem-solving abilities in elementary students through educational robotics and basic coding. This

outcome ensures that university training is no longer detached from the requirements of modern schools, thereby reducing the "technological anxiety" that often characterizes the current teaching force.

A critical expected outcome is the formation of ethical awareness and digital safety. The implementation of the reform will equip teachers with the necessary instruments to protect student data privacy and critically evaluate AI-generated information. They will serve as guides for parents and children in navigating digital spaces safely.

Finally, alignment with the European DigCompEdu framework will raise quality standards and the international mobility of Albanian teachers. In the long term, this reform is expected to increase the engagement and academic success of primary school students by creating an interactive, inclusive, and future-oriented learning environment. The success of these outcomes will mark the transition from a traditional educational system toward a digitally competent educational ecosystem.

7. Conclusions

This paper analyzes the urgent need for reforming the Bachelor curriculum in primary teacher preparation, focusing on the integration of Information Technology and Artificial Intelligence. The comparative analysis between the current model in Albania and the Estonian model shows that:

The current model of teacher training in Albania is insufficient to meet the challenges of digital education. Treating technology as an isolated and technical subject (often limited to the Office suite) creates a significant gap between teacher competence and the pedagogical needs of the modern classroom. The absence of Artificial Intelligence and Computational Thinking in current syllabi demonstrates a misalignment between the academic offering and 21st-century reality.

The Estonian experience (ProgeTiiger) serves as evidence of the efficiency of transversal integration. This experience shows that technology should not be taught as an end in itself, but as a cognitive tool that empowers the methodologies of language, mathematics, and science. The shift from a "technical" model to a "pedagogical-technological" one (TPACK) is a *sine qua non* for a teacher capable of effectively managing interactive learning environments.

The curricular reform in Albania should be based on four instrumental pillars:

1. Integration of AI as a tool for personalizing instruction;
2. Development of Computational Thinking from the initial stages of the Bachelor degree;
3. Training on data ethics and digital safety;
4. Revision of pedagogical practices to include the assessment of "in-situ" digital competence.

Curricular reform must not be treated merely as an administrative process; it is a fundamental shift in academic culture. Its successful realization requires close cooperation between policymakers, universities, and primary schools. Without a well-prepared teacher at the Bachelor level, investments in the technological infrastructure of schools will remain underutilized. This study highlights the immediate need for Albanian universities to adopt European standards (DigCompEdu) to ensure that future teachers are not just users, but architects of the education of the future.

8. Strategic and Practical Recommendations

8.1. For Higher Education Institutions (Universities)

-*Hybridization of Methodologies*: An immediate revision of methodological course syllabi (Language, Mathematics, and Science Methods) is recommended to include at least 20–30% of content related to the use of AI and IT tools within that specific discipline.

-*Creation of "Pedagogical Intelligence Laboratories*": Universities should invest in spaces where Bachelor students can experiment with educational robotics (such as Bee-Bot or Lego Education) and adaptive platforms before applying them in practice.

-*Academic Staff Training*: Curricular reform cannot occur without reforming the teaching methods of the faculty themselves. It is recommended to establish internal qualification programs for professors regarding generative technologies and new research tools.

8.2. For the Bachelor Program Structure

-*Introduction of a "Computational Thinking and AI" Module*: This module should be mandatory in the second year of study, focusing on algorithmic logic, data ethics, and cybersecurity for children.

-*Digital Performance-Based Assessment*: Student graduation should be conditional upon a digital portfolio demonstrating the ability to create interactive lesson plans and the use of AI for the formative assessment of students.

8.3. For Professional Practice and School Linkages

-*Dual Mentorship*: During pedagogical practice, the student should be guided by a mentor (school teacher) who possesses digital competencies, ensuring that technology is actually used in the classroom and not merely discussed theoretically.

-*Partnership with the Estonian Model*: It is suggested to create "Erasmus+" exchange programs or bilateral agreements with Estonian universities to adopt the best practices of the ProgeTiiger model.

8.4. For Policymakers (Ministry of Education and Sports)

-*Standardization of Competencies*: The official adoption of the DigCompEdu framework as a national guide for the accreditation of teacher education programs is recommended.

-*Incentives for Innovation*: The creation of research grants for Bachelor students who develop innovative projects (such as applications or AI tools) specifically dedicated to the Albanian elementary cycle.

Ethical Considerations

This study was conducted in accordance with internationally recognized ethical standards for academic research, including the principles outlined by the Committee on Publication Ethics (COPE) and the Declaration of Helsinki (where applicable). The research is based exclusively on secondary data sources and previously published academic literature. Therefore, no human participants were directly involved, and no personal or sensitive data were collected. All sources of information have been properly cited and referenced in accordance with APA 7 guidelines to ensure academic integrity and to avoid plagiarism. The author has made every effort to ensure the accuracy, transparency, and reliability of the data presented. Any potential limitations of the data sources have been critically considered in the analysis.

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Data Availability Statement

The data supporting the findings of this study are derived from publicly available sources, including official curriculum documents, policy reports, and educational frameworks. These sources are cited within the article.

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Use of Artificial Intelligence (AI)

No artificial intelligence tools were used in the design, analysis, or writing of this research. All intellectual contributions are solely attributed to the author.

Conflict of Interest

The author declares that there are no conflicts of interest regarding the publication of this paper. The research was conducted objectively, and no financial or personal relationships have influenced the outcomes or interpretations presented in this study.

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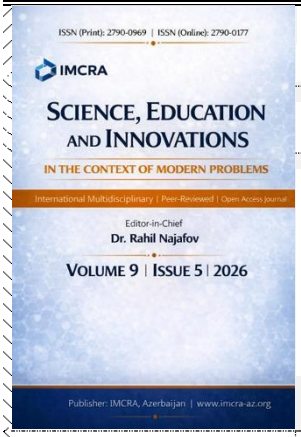
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RESEARCH ARTICLE

Reconceptualizing Bilingualism and Multilingualism in the Era of Globalization: A Sociolinguistic, Cognitive, and Language Policy Analysis with Evidence from Azerbaijan

Sevinj Ahmadova
Doctor of Philological Sciences
Azerbaijan State University of Culture and Arts
Baku, Azerbaijan
E-mail: sevinj.ahmadova@admiu.edu.az; https://orcid.org/0000-0002-5650-6807

Keywords
Bilingualism and Multilingualism; Globalization and Language Dynamics; Sociolinguistics; Language Contact and Interference; Linguistic Identity; English as a Lingua Franca; Language Policy and Education; Cognitive Implications of Bilingualism; Multilingual Societies; Azerbaijan Linguistic Context

Abstract
Bilingualism and multilingualism have emerged as central features of contemporary linguistic landscapes, shaped by the accelerating forces of globalization, migration, and digital communication. In the context of Sociolinguistics, these phenomena are no longer viewed as static competencies but as dynamic, socially embedded practices that influence identity formation, intercultural interaction, and socioeconomic mobility. This study provides a critical and integrative analysis of the theoretical foundations, typologies, and functional dimensions of bilingualism, drawing on classical and contemporary scholarship. Moving beyond descriptive accounts, the article systematizes key classifications of bilingualism—contact vs. non-contact, unilateral vs. bilateral, and receptive vs. productive forms—while examining their sociolinguistic drivers and cognitive implications. It further traces the historical evolution of scholarly attitudes toward bilingualism, from early deficit-oriented perspectives to contemporary recognition of its cognitive, developmental, and communicative advantages. Special attention is given to the impact of globalization on linguistic hierarchies, particularly the role of English as a dominant global lingua franca and its implications for language policy, education systems, and cultural identity. Through a contextualized analysis of Azerbaijan, the study explores how multilingual practices are shaped by the interaction of historical legacies, notably the influence of Russian, and current global trends that elevate the status of English alongside the national language. The findings demonstrate that bilingualism operates simultaneously as a resource and a site of tension, enabling intercultural competence and economic participation while also generating risks of language shift and identity reconfiguration. By integrating theoretical perspectives with contextual analysis, the study contributes to the advancement of bilingualism research through a more nuanced and comparative framework that captures the complexities of language use in a globalized world.

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1. Introduction

In the contemporary era of globalization, linguistic practices have undergone profound transformation as the boundaries between cultures, economies, and societies become increasingly fluid. Language is no longer merely a medium of communication but a critical instrument of social integration, economic participation, and cultural negotiation. Within this evolving landscape, Bilingualism and Multilingualism have emerged as defining features of modern societies, reflecting the intensification of migration, international education, global trade, and digital interconnectedness. These phenomena are not exceptional or peripheral; rather, they constitute normalized and widespread modes of linguistic practice that shape both individual competencies and collective identities.

From a Sociolinguistics perspective, bilingualism and multilingualism are best understood as dynamic and context-dependent processes embedded within broader structures of power, ideology, and globalization. The growing prominence of English as a global lingua franca has reconfigured linguistic hierarchies, enabling access to global communication networks while simultaneously reinforcing asymmetries between dominant and minority languages. This dual process generates complex patterns of language contact, interference, and adaptation, raising critical questions about linguistic diversity, identity formation, and the sustainability of national languages in a globalized world.

Moreover, the expansion of multilingual practices has significant cognitive and social implications. Research in psycholinguistics demonstrates that bilingual individuals often exhibit enhanced cognitive flexibility, metalinguistic awareness, and problem-solving abilities. At the same time, the sociopolitical context in which bilingualism develops plays a decisive role in determining whether it functions as a resource for empowerment or a mechanism of linguistic marginalization. Consequently, the study of bilingualism requires an integrative approach that connects theoretical frameworks with real-world sociolinguistic conditions.

Within this broader context, Azerbaijan provides a particularly illustrative case of multilingual interaction shaped by historical, political, and contemporary global forces. The legacy of the Soviet period has sustained the influence of the Russian language, while ongoing globalization has elevated the status of English as a language of international communication, education, and professional advancement. Simultaneously, the Azerbaijani language remains central to national identity and cultural continuity. This coexistence of Azerbaijani, Russian, and English reflects a layered and dynamic linguistic environment characterized by both contact and non-contact forms of bilingualism, as well as varying degrees of linguistic prestige and functional distribution.

Against this backdrop, the present study aims to provide a comprehensive and analytically grounded examination of bilingualism and multilingualism in the context of globalization. Specifically, it seeks to (i) critically analyze the theoretical foundations and typologies of bilingualism, (ii) examine the evolution of scholarly and societal attitudes toward multilingual practices, and (iii) explore the sociolinguistic implications of these processes within the Azerbaijani context. By integrating global theoretical perspectives with a localized case study, the article contributes to a more nuanced understanding of how bilingualism and multilingualism function as both instruments of cultural preservation and drivers of socioeconomic and intercultural transformation in the contemporary world.

2. Methodology

This study adopts a qualitative research design grounded in a systematic and descriptive-analytical literature review. The methodological framework integrates principles from Sociolinguistics and interdisciplinary language studies to examine the conceptual, historical, and functional dimensions of bilingualism and multilingualism in the context of globalization.

Data Sources and Selection Criteria

The analysis is based exclusively on secondary data derived from peer-reviewed academic literature, including journal articles, scholarly books, conference papers, and selected statistical and institutional reports published between 1999 and 2024. Particular emphasis was placed on sources indexed in major international databases such as Scopus and Web of Science to ensure academic quality, relevance, and credibility.

A purposive sampling strategy was employed to identify key works addressing bilingualism, multilingualism, language contact, and globalization. Selection criteria included (i) theoretical relevance, (ii) citation impact, (iii) geographical and contextual applicability—especially to post-Soviet and multilingual societies—and (iv) recency of publication. In total, 21 core sources in English, Azerbaijani, and Russian were selected as the primary analytical corpus, supplemented by additional high-impact theoretical references to support conceptual interpretation.

Analytical Procedures

The study utilizes qualitative content analysis to systematically examine and synthesize the selected literature. This approach enabled the identification of key themes, typologies, and conceptual frameworks related to bilingualism, including its classifications, sociolinguistic drivers, and cognitive implications. In addition, a comparative analytical method was applied to explore variations in bilingual practices across different sociocultural and geopolitical contexts.

An interpretive analytical approach was further employed to trace the historical evolution of scholarly attitudes toward bilingualism—from early deficit-oriented perspectives to contemporary recognition of its cognitive and social benefits. Particular attention was given to contextualizing these developments within the broader processes of globalization and linguistic change.

Scope and Limitations

This study does not involve primary empirical data collection; rather, it is based entirely on the synthesis and critical interpretation of existing scholarly literature. While this approach allows for a comprehensive theoretical and comparative analysis, it may limit the ability to provide statistically generalizable findings. Nevertheless, the methodological design ensures analytical depth and conceptual rigor, particularly in relation to the Azerbaijani sociolinguistic context.

3. Literature Review

The study of bilingualism has evolved from a narrowly defined linguistic phenomenon into a multidimensional field intersecting with sociology, education, psychology, and globalization studies. In contemporary scholarship, bilingualism is no longer

understood merely as the coexistence of two languages within an individual, but rather as a dynamic and context-dependent practice shaped by social structures, power relations, and global mobility. This shift reflects broader transformations associated with globalization, which has intensified linguistic contact, reconfigured language hierarchies, and expanded the functional domains of multilingual communication.

1. Conceptualizing Bilingualism in Contemporary Linguistics

Early foundational works, such as Uriel Weinreich's seminal theory of language contact and Joshua A. Fishman's sociological approach to language use, established bilingualism as a structured and socially embedded phenomenon. These perspectives emphasized the role of community, identity, and language domains in shaping bilingual competence. Subsequent developments expanded the conceptual scope of bilingualism, moving beyond rigid categorizations toward more fluid and functional interpretations.

Contemporary scholars, including François Grosjean, argue that bilingual individuals should not be evaluated against monolingual norms but rather understood as possessing integrated linguistic systems adapted to specific communicative contexts. Similarly, the work of Colin Baker highlights the cognitive, educational, and sociocultural dimensions of bilingualism, emphasizing its role in fostering cognitive flexibility, metalinguistic awareness, and intercultural competence.

Bilingualism in the Context of Globalization

The acceleration of globalization has fundamentally transformed the nature and distribution of bilingualism. As noted by David Crystal, the emergence of English as a global lingua franca has reshaped linguistic ecologies, creating new forms of bilingualism characterized by the coexistence of local and global languages. This phenomenon is particularly evident in post-Soviet and developing contexts, where linguistic practices are increasingly influenced by global economic integration, digital communication, and educational reforms.

Scholars such as Ofelia García and Li Wei introduce the concept of *translanguaging*, which reconceptualizes bilingualism as a fluid process of meaning-making across linguistic boundaries rather than the alternation between discrete language systems. This perspective aligns with the broader framework of "superdiversity" proposed by Jan Blommaert, which emphasizes the complexity and heterogeneity of contemporary linguistic landscapes shaped by migration, technology, and global interconnectedness.

At the same time, critical scholars such as Robert Phillipson highlight the asymmetrical power relations embedded in global language dynamics, particularly the dominance of English and its implications for linguistic inequality and cultural dependency. These debates underscore the dual nature of globalization: while it facilitates linguistic diversity and mobility, it also risks homogenization and the marginalization of minority languages.

Sociolinguistic and Cognitive Implications of Bilingualism

Empirical research consistently demonstrates that bilingualism has significant cognitive and social implications. Studies in psycholinguistics suggest that bilingual individuals exhibit enhanced executive control, problem-solving abilities, and cognitive flexibility (Bialystok, 2001). From a sociolinguistic perspective, bilingualism plays a crucial role in identity construction, social integration, and cultural negotiation, particularly in multilingual societies.

However, these benefits are not uniformly distributed. The sociopolitical context in which bilingualism develops often determines whether it functions as a resource or a constraint. In contexts characterized by linguistic hierarchies, such as those shaped by colonial or post-colonial dynamics, bilingualism may lead to language shift, identity conflict, and reduced prestige for minority languages. This is particularly relevant in transitional societies, where language policies and educational systems play a decisive role in shaping linguistic outcomes.

Bilingualism in Azerbaijan: A Contextual Perspective

Within the Azerbaijani context, bilingualism reflects a complex interplay of historical, political, and socioeconomic factors. The legacy of the Soviet period has resulted in the continued influence of the Russian language, while globalization has increased the prominence of English as a language of international communication and professional advancement. As a result, Azerbaijan exhibits a layered bilingual and multilingual environment characterized by both contact and non-contact bilingualism.

Existing studies indicate that language choice in Azerbaijan is closely linked to factors such as education, socioeconomic status, and urbanization, with Russian and English often associated with higher prestige and economic opportunity. At the same time, the Azerbaijani language remains central to national identity and cultural continuity. This dual dynamic creates both opportunities and tensions, as individuals navigate competing linguistic demands in different social and professional contexts.

Research Gap and Contribution

Despite the extensive literature on bilingualism and globalization, several gaps remain. First, much of the existing research is either highly theoretical or focused on Western contexts, with limited integrative analysis of post-Soviet societies such as Azerbaijan. Second, there is a lack of comprehensive frameworks that connect typologies of bilingualism with globalization processes and their socio-cognitive implications in specific national contexts.

Addressing these gaps, the present study offers a structured and context-sensitive analysis of bilingualism in the era of globalization, with particular attention to Azerbaijan. By integrating theoretical insights with sociolinguistic realities, the study contributes to a more nuanced understanding of how global forces reshape linguistic practices, identities, and inequalities. In doing so, it advances the discourse from descriptive accounts toward a more analytical and comparative framework that highlights both opportunities and challenges associated with bilingualism in contemporary society.

4. Discussion

The findings of this study reinforce the understanding that bilingualism in the era of globalization is not merely a linguistic competence but a complex socio-cognitive and political phenomenon shaped by structural inequalities, historical legacies, and evolving global dynamics. Building upon the theoretical synthesis presented in the literature review , the discussion highlights the dual and often contradictory nature of bilingualism as both a resource and a source of tension within contemporary societies.

First, the analysis confirms that globalization has significantly redefined the functional roles of languages, particularly through the expansion of English as a global lingua franca. While this development enhances access to international education, economic opportunities, and digital communication, it simultaneously reinforces hierarchical language systems in which local and minority languages may be marginalized. This supports the critical perspective that bilingualism under globalization operates within unequal power structures rather than neutral linguistic exchange. In the Azerbaijani context, this dynamic is especially visible in the coexistence of Azerbaijani, Russian, and English, where each language carries distinct symbolic, cultural, and socioeconomic capital.

Second, the study demonstrates that the typological distinctions of bilingualism—such as contact vs. non-contact, unilateral vs. bilateral, and receptive vs. productive forms—are not merely theoretical classifications but reflect real sociolinguistic processes that shape language use and identity. For example, unilateral bilingualism, often observed among minority or socially mobile groups, highlights asymmetries in language acquisition and reinforces patterns of linguistic adaptation driven by necessity rather than choice. In contrast, bilateral bilingualism, although less common, represents a more balanced and equitable linguistic interaction that supports intercultural dialogue and mutual recognition.

Third, from a cognitive and social perspective, the findings align with existing research indicating that bilingualism contributes to enhanced cognitive flexibility, metalinguistic awareness, and intercultural competence. However, this study extends the discussion by emphasizing that these benefits are context-dependent. In environments characterized by linguistic inequality or sociopolitical pressure, bilingualism may lead to identity fragmentation, language attrition, or reduced proficiency in one of the languages. This highlights the need to move beyond universal claims about the advantages of bilingualism and adopt a more nuanced, context-sensitive approach.

Furthermore, the Azerbaijani case illustrates how bilingualism is embedded within broader processes of nation-building, globalization, and educational policy. The continued influence of Russian reflects historical and institutional continuity, while the growing importance of English signals alignment with global economic and academic systems. At the same time, the Azerbaijani language remains central to national identity and cultural preservation. This creates a dynamic linguistic equilibrium in which individuals strategically navigate multiple languages depending on context, purpose, and social positioning.

Importantly, the study underscores that language policies and educational frameworks play a decisive role in shaping the outcomes of bilingualism. Policies that promote additive bilingualism—where additional languages are learned without displacing the native language—are more likely to yield positive cognitive and social outcomes. In contrast, subtractive bilingualism, where dominant languages replace minority or national languages, poses significant risks for linguistic diversity and cultural sustainability.

Finally, the discussion highlights a critical gap in current research: the lack of integrative frameworks that connect typological classifications of bilingualism with real-world sociopolitical and economic conditions. By linking theoretical models with the Azerbaijani context, this study demonstrates the importance of contextualizing bilingualism within specific national and global settings. This approach not only enriches theoretical understanding but also provides practical insights for policymakers, educators, and researchers.

Bilingualism and Multilingualism

When we learn any language in addition to our native tongue, we become either bilingual or multilingual. Multilingualism is the phenomenon of using more than two languages. The main significance of multilingualism lies in the necessity of possessing several languages in a globalizing world. Familiarity with any nation's culture primarily occurs through mastering and learning that nation's language. Therefore, mastering and learning languages, which serve as means of communication and connections between peoples, is becoming increasingly important.

As a socio-cultural phenomenon, multilingualism creates conditions for young people to prepare for life in a multiethnic and polymultural environment. It facilitates the establishment of relations with people belonging to different ethnic groups, religions, and races, and contributes to the formation of skills and habits such as tolerance and endurance.

Among the first to study multilingualism was Joshua Fishman (1971). The majority of research works on the issue have been conducted under the influence of or as a continuation of Fishman's ideas. Another linguist, John Gumperz, studied the language diversity of India in his work. According to Gumperz's approach expressed in the work, language is viewed primarily as a means

of interaction. It was precisely the research conducted by J. Fishman and J. Gumperz that laid the foundation of sociolinguistics (Blommaert & Spotti, 2017: 8).

In most cases, the emergence of multilingualism has been related to bilingualism. In other words, bilingualism can be accepted as the cause of the emergence of multilingualism. Depending on the age period in which the language is mastered, bilingualism is divided into two types: early and late. In addition, receptive (receiving), reproductive (transmitting), and productive (creating) bilingualism can be distinguished. The latter, productive bilingualism, serves as the main goal of learning new languages.

For many years, bilingualism was negatively perceived by society. Most scholars, including parents, believed that the flow of information in two languages could be harmful to the child and could cause confusion. This, in turn, could create obstacles in the child's development and even halt their cognitive progress (Ibadova, 2019: 21). Only after 1962 did attitudes toward bilingualism change. This was due to research conducted by Canadian psychologists Elizabeth Peal and Wallace Lambert. The studies revealed that bilingualism does not create any obstacles to children's intellectual development; on the contrary, it accelerates it.

Forms and types of Bilingualism

Bilingualism manifests mainly in two forms: unilateral and bilateral. Unilateral bilingualism occurs more frequently when small ethnic groups live in the same territories with larger ethnic groups (peoples, nations) and maintain constant political, economic, cultural, and social relations with them. For example, bilingualism observed among non-Russian populations in all autonomous entities within the Russian Federation, as well as among small ethnic groups living in Azerbaijan (Talis, Tats, Kurds, Gryz, Khinalug, Budukh, Udi), Abkhaz, Ossetians, Adjarians, Batsbi, and Greeks in Georgia, Ishkashimi and Yazgulami in Tajikistan, and Uyghurs, Mongols, Manchus, and Tibetans in China, is unilateral. In other words, while representatives of minority ethnic groups learn the language of the majority, representatives of the majority ethnic group do not know the language of the minority group. In such conditions, small ethnic groups without their own writing system merge linguistically, culturally, and even ethnically with larger ethnic groups. This can be considered assimilation. As a result of the merger, the small people gradually lose their native language.

Bilateral bilingualism occurs when two languages mutually influence each other. In this case, representatives of both languages know each other's languages. For example, Uzbeks knowing Tajik and Tajiks knowing Uzbek in neighboring areas of Uzbekistan and Tajikistan represents bilateral bilingualism. Similarly, Russians living in Azerbaijan knowing Azerbaijani and Azerbaijanis knowing Russian is also a case of bilateral bilingualism. Unlike unilateral bilingualism, in bilateral bilingualism there is no destruction or replacement of the native language or language shift. Bilateral bilingualism is simply a process of language exchange.

According to its occurrence, bilingualism has two main types: contact (or contactual) and non-contact (or non-contactual).

Contact bilingualism arises when two languages or ethnic groups are in constant contact and communication in their daily shared life. Contact bilingualism is a more stable and fixed linguistic phenomenon, often regular in nature, and in some cases transmitted hereditarily. Therefore, contact bilingualism plays a key role in language change during language crossings. This type is more commonly encountered during the cohabitation of a small ethnic group with a larger ethnos. The language formed as a means of interethnic communication can be cited as an example of this type of bilingualism.

Non-contact bilingualism occurs through learning a second language through special methods. Thus, in various countries, English, Russian, German, French, Spanish, Persian, Arabic, Chinese, Hindi, and other languages are taught in secondary and higher education institutions. This teaching process leads to the emergence of non-contact bilingualism. Languages of international importance are taught through this type of bilingualism, i.e., in educational institutions.

In contact bilingualism, entire ethnic groups and peoples can be bilingual. In contrast, non-contact bilingualism refers only to the bilingualism of individual individuals or social groups.

The mentioned factors have enabled the emergence of bilingualism even in middle-aged people. In recent years, the globalization process occurring in the world has further highlighted these factors, resulting in an increase in multilingualism among people. In turn, bilingualism has become one of the main driving forces of the globalization process.

U. Weinreich, considered the founder of the theory of interlingual relations, in his work indicates three main types of bilingualism: coordinate, compound, and subordinate. In addition, linguistic literature notes types of bilingualism such as natural and artificial, mass and individual, direct and indirect, receptive and creative, normal and abnormal, balanced and dominant. In modern linguistic science, when classifying the phenomenon of bilingualism and determining its characteristics, linguistic, psycholinguistic, psychological, sociological, linguodidactic, cognitive, and other approaches have existed (Kosharnaya & Karimullah, 2023: 526).

Bilingualism in scientific research

The study of bilingualism plays a very important role in terms of language development and determining relationships between languages of different origins. Many studies have been conducted at the scientific level to determine the essence of bilingualism and the features of its emergence, and articles, theses, and other scientific research works have been written. As a result of these studies, the importance of paying special attention to the following factors in the study of bilingualism has been determined:

- The age of the person possessing the language;
- How the second language is mastered;
- The level of use of the second language;
- Skills in the second language – speaking, writing, listening, and reading (Landsberry, 2019: 148).

All these factors must be approached in a parallel and systematic manner. Only in this way will it be possible to deeply understand the essence of the phenomenon of bilingualism.

Among the scholars who have studied the problem of bilingualism in linguistics and written scientific works on the issue, the names of O.S. Akhmanova, L.Kh. Daurova, Yu.D. Desheriev, K.Kh. Khanakov, V.G. Kostomarov, M.S. Sayev, J.A. Hutenko, and others can be mentioned.

Among Azerbaijani linguists who have studied the issue, A. Gurbanov, R. Rajabli, F. Veysalli, L. Gurbanova, R. Heydarov, K. Jafarova, and others have put forward certain ideas and conducted scientific research (Bayramova, 2024: 110). The phenomenon of bilingualism has been studied more by Western and Russian linguists. From their ranks, the names of L. Bloomfield, A. Sirbu, G. Karagac, and A. Aslan can be especially noted.

Among the prominent linguists who have dealt with the issue of bilingualism, the names of U. Weinreich, S. Ervin, and C. Osgood should first be mentioned. Approaching bilingualism from a somewhat different perspective, they distinguished "compound bilingualism, which shows the merging of two languages into a single system, and coordinate bilingualism, in which the two language systems exist independently" (İsmayılova, 2018: 29).

One of the first studies on bilingualism in Western science was conducted by John Edwards in the 1980s-1990s. As a result of this study, J. Edwards came to the conclusion that bilingual people were better developed than non-bilingual people in some intellectual indicators (Blommaert & Spotti, 2017: 5).

As a result of long-term research, linguists concluded that if a bilingual person speaks more in one of the two languages they possess, that language should be considered their native language. R. Heydarov states that if a person is an immigrant or belongs to an ethnic minority, they will not be able to use their native language in school or other public places; this language will only be learned at the household level, and the person will not be able to express themselves clearly in that language. In other words, they will hardly be able to speak that language. As a result, for this person, the first language role will be played by a language that is not their native tongue (Heydərov, 2013: 177).

According to Yu.D. Desherieva, bilingualism is simply the possession of two languages and the ability to speak them. V.A. Avorin also supports this idea, stating: "Bilingualism is the free mastery of two languages. In other words, bilingualism begins with the approximation of knowledge existing in the second language to the knowledge and skills in the first language" (İsmayılova, 2018: 29-30).

A. Gurbanov, in his scientific research work, defined bilingualism as follows: "The meaning of bilingualism is bilingualism. The use of two languages simultaneously in one country is called bilingualism in science" (Bayramova, 2024: 111).

Other linguists who expressed opinions on bilingualism were T. Weinreich and E.M. Vereshchagina. In their research, they note that the process of using two languages alternately can be called bilingualism. The level of mastery of the language must be indicated in this process. The experience of using those languages alternately already implies that they can be used for communication. Based on this, a person carrying two language systems can be called bilingual.

Regarding the classification of bilingualism, E.M. Vereshchagin divided it into three groups in his work:

- Receptive bilingualism – in this case, the bilingual person understands speech in the second language system. This type of bilingualism is more often referred to in the study of dead languages.
- Reproductive bilingualism – the bilingual person understands what they read and hear in the second language and can speak it.
- Productive bilingualism – a person possessing two languages fully understands, speaks, and produces speech existing in the system of the second language (İsmayılova, 2018: 30).

In scientific research, many other factors limiting bilingualism and its formation have existed. Thus, bilingualism on one hand involves the relationship between multilingual speech existing in society and the intensity characterizing it, and on the other hand, it encompasses a unique system between the socio-demographic characteristics of the subjects forming the systematicity of the multilingual speech process. Regarding this issue, T.E. Vladimirova, in her research work, pays great attention to the concept of "multilingualism" and states that speech or part of speech forms a system between two languages. In unexpected multilingual situations, it creates the illusion that the speaker can speak in the second language without knowing it. This process is a method of psychological self-regulation of a person.

L.V. Shcherba, speaking about the methods and ways of mastering a second language, shows that bilingualism can be artificial and natural. The author calls the second language mastered through school, teacher, and textbook artificial bilingualism, and the second language mastered as a result of direct communication with native speakers of foreign languages natural bilingualism.

L.V. Shcherba also divides bilingualism into two types according to its intensity and extensiveness: individual and mass. In turn, mass bilingualism itself is classified by the author into two types: full bilingualism, where the entire people are bilingual, and partial bilingualism, where only part of the people are bilingual.

In addition, L.V. Shcherba divides bilingualism into pure and mixed types according to the characteristic features of the relationship between adjacent languages. The author considers pure bilingualism a phenomenon where no comparison or parallelism can be made between the two languages. Therefore, translation from one language to another is either impossible or very difficult. The Russian nobility of the 19th century can be cited as an example of this type of bilingualism: they could not translate from Russian to French or from French to Russian (Allahverdiyeva & Yunusova, 2021: 110).

Mixed bilingualism involves the parallel connection in the speaker's consciousness of equivalent means of two different languages in the form of a single concept. This unique system performs the role of universal thinking for both adjacent languages. For this reason, these languages are not limited to living side by side; they also mutually influence each other. In mixed bilingualism, the means of expression of both languages correspond to all concepts and notions. One of them comes from the first language, the other from the second. For this reason, translation of speech from one language to another occurs more easily and almost automatically.

Table 1. Typology of Bilingualism in the Context of Globalization: Characteristics, Drivers, and Socio-Cognitive Implications

Type of Bilingualism	Defining Characteristics	Primary Drivers	Sociolinguistic Context	Cognitive and Social Implications	Risks and Challenges
Early Bilingualism	Acquisition of two languages in early childhood; simultaneous or sequential learning	Family environment; parental language practices	Multilingual households; migrant or mixed-language families	Enhanced cognitive flexibility; improved executive function; stronger language acquisition capacity	Possible language dominance imbalance; initial lexical confusion
Late Bilingualism	Acquisition of a second language after early childhood	Formal education; professional requirements; globalization	Educational institutions; adult learning environments	Development of metalinguistic awareness; increased adaptability in communication	Lower fluency compared to native speakers; higher cognitive load
Receptive Bilingualism	Ability to understand a second language without active production	Passive exposure; media; cultural contact	Minority groups; diaspora communities	Improved comprehension skills; cultural awareness	Limited communicative competence; reduced active usage
Productive Bilingualism	Full ability to understand and actively use both languages in communication	Education; sustained interaction; social necessity	Multilingual societies; international professional contexts	High communicative competence; cognitive flexibility; intercultural competence	Language interference; code-switching challenges
Contact Bilingualism	Arises from direct interaction between linguistic communities	Migration; trade; political integration	Border regions; multiethnic societies	Development of hybrid linguistic forms; social cohesion	Language shift; minority language erosion
Non-Contact Bilingualism	Learned through formal instruction without direct immersion	Education systems; global language demand (e.g., English)	Schools, universities, online learning platforms	Access to global knowledge; academic and professional mobility	Lack of cultural depth; limited pragmatic competence
Unilateral Bilingualism	Minority groups learn the majority language, but not vice versa	Sociopolitical dominance; economic necessity	Post-colonial and multiethnic states	Social integration; access to resources and opportunities	Assimilation risk; loss of minority languages and identity

Bilateral Bilingualism	Mutual language acquisition between linguistic groups	Cultural exchange; balanced sociopolitical relations	Multilingual regions with equal language status	Intercultural dialogue; linguistic diversity preservation	Increased complexity in language policy and education
Globalized (English-Dominant) Bilingualism	Integration of a global lingua franca (English) with native language	Globalization; digital communication; education policies	International academic and professional environments	Expanded global communication; access to international networks	Linguistic homogenization; cultural dependency; language inequality

Another linguist, Yu.D. Desheriev, divides bilingualism into three types according to the degree of extensiveness: nationwide, territorial, and covering part of the people.

Bilingualism in the context of globalization

In the modern world, rapid development and change are observed in all spheres of public life—political, economic, cultural, linguistic, etc. The main indicator of these changes has been the mass media—television, radio, cinema, and others. In a globalizing society, two main directions are observed: inclination toward the Western lifestyle and assimilation with the American cultural model. Cosmopolitanism can be noted as a middle path alongside these two positions (Vishnevskaya, 2018: 42).

It is estimated that the number of languages currently used in the world is close to 6,000 (Tucker, 1999: 1). Nevertheless, a very small number of languages are used as means of interethnic communication. These languages include English, Arabic, Bengali, French, Hindi, Malay, Chinese, Portuguese, Spanish, Turkish, and Russian. In most cases, the second and even third languages learned by people later are one of the mentioned languages. As a result of the expansion of bilingualism and multilingualism, 25% of the nearly 200 countries in the world currently officially accept at least two languages as their state languages. For this reason, the prominent linguist E.Y. Litvinenko considered the language choice issue one of the main problems of the globalization process (Yur'evna, 2017: 159).

The language choice issue greatly harms bilingualism and its development. The problem is more common in former colonial territories. When colonies gained independence and established their states, they faced serious language issues. This problem involved the widespread use of the languages of the metropolises alongside local languages in those states. From a linguistic point of view, granting status to both languages and their parallel development and use was positive, forming bilingualism in those states. However, giving choice to only one language led to the gradual disuse of the second language in the country's territory (Dash, 2022).

The language policy of any state has depended to one degree or another on the language relations system. In this respect, bilingualism, which is a component of the language system and the main driving force of the globalization process, has been a feature belonging to all periods of humanity. Especially in Eastern states, a sufficient number of bilingualism cases are found in the most ancient periods. Nevertheless, as a socio-historical phenomenon, bilingualism began to attract attention only from the Renaissance period. At that time, prominent intellectuals learned other languages and laid the foundation of new national literary languages, for example, French, Italian, Spanish, and other Romance languages formed on the basis of Latin (Adawiyah & Gumartifa, 2022). At the same time, some languages began to emerge and develop to serve certain purposes. Arabic for the Islamic religion and Latin as the language of science in European countries can be cited as examples.

From the Renaissance period onward, languages emerged for establishing communication between different nations. Such languages include Persian and Arabic in the Near and Middle East, Latin and later French in Europe, Chinese in East and Southeast Asian countries, and Azerbaijani in the 19th-century Caucasus and Near East (Ahmadova, 2025).

In the period when class society existed, bilingualism constituted the main essence of that society. In most cases, either the upper, elite strata of society or holders of certain professions were bilingual. This was considered an indicator of their superiority. For example, until the October Revolution, the vast majority of the elite and intellectual strata of Russian society knew French along with Russian. All doctors knew Latin along with their native languages. In general, a large part of those engaged in politics, science, religion, and diplomacy had either bilingualism or multilingualism.

However, not only individuals but also entire peoples can be bilingual. The level and degree of manifestation of bilingualism in this case has depended on the level of political, economic, social, and cultural development of that people, the socio-economic and political-cultural structure of society—in short, on the characteristics of the people's development in a specific historical period.

Bilingualism is encountered more widely in multiethnic states. For example, the vast majority of peoples living in the former USSR countries know Russian along with their own languages, and Russian plays the role of a second native language for them.

Small ethnic communities and small peoples, in addition to their native languages and Russian, accept the language of the people constituting the majority of the country they live in as their native language. For example, small ethnic groups living in Azerbaijan – Talis, Kurds, Tats, Budukh, Udi, Gryz, Khinalug, Sakur, Lezgis, Avars, Laks, and others, use their native languages within their families in everyday life, and Azerbaijani or Russian in public life and education.

Other examples include Abkhaz, Adjarians, Batsbi, Ossetians in Georgia, Livonians in Estonia, Ishkashimi and Yazgulami in Tajikistan, Uyghurs in Kazakhstan, and Yugurs and Dungans in Kyrgyzstan. Each of these small ethnic groups uses the Georgian, Estonian, Tajik, Kazakh, and Kyrgyz languages respectively as a second native language, and Russian as an interethnic means (Allahverdiyeva & Yunusova, 2021: 111).

In the modern period, with the acceleration of globalization, bilingualism is encountered more widely. For example, the majority of the population living in most of Central and South America, as well as in European states such as Switzerland and Belgium, is bilingual. In the USA, one in every ten English-speaking citizens considers French, Spanish, German, Russian, Ukrainian, Chinese, or any other language as their second native language. As noted, the absolute majority of the population of the republics in the former Soviet space were bilingual, and now they are multilingual in the conditions of the wide spread of English.

The acceleration of globalization gives rise to many opposite processes, including individualization, specialization, regionalization, decentralization, and others. These processes also had some linguistic conditions. Thus, in the period of globalization, the native language resists this process and does not want to be destroyed. As a result, the people "struggle" to protect their customs and traditions, national mentality, and existence.

In this respect, in the period of modern market economy, the ability of various states to withstand competition has been of vital importance. In this regard, the famous Russian psychologist A.I. Yuryev said: "The competitiveness of the state can only be ensured with the help of human resources" (İsmayılova, 2018: 30). According to A.I. Yuryev, this process has depended more on the state's material wealth. However, for increasing the state's competitiveness, the role of human resources has been more important and significant than raw materials, technology, and other resources. For this reason, A.I. Yuryev considered that all material wealth remains "dead" until used by competitive human beings. Based on this, the scholar believed that the main task of the state is to create competitive human capital. In this context, the state's language and language teaching policy has played a special role.

Interlingual relations and Bilingualism

Bilingualism is the result of the process of mutual influence of two or more languages. However, in practice, cases of two languages being mastered at the same level are encountered very rarely. As a rule, for a bilingual person, one of the languages is closer. It is this first-degree, closer, language that is called the native language in linguistics. In this sense, none of the languages a person knows can replace their native language or stand at the same level with it.

For this reason, in the context of the wide development of political, economic, and cultural relations, studying and researching the problem of bilingualism in modern society has become one of the main issues of linguistics. Bilingualism is the main form and indicator of the existence, progress, and functioning of language. As a problem, the phenomenon of bilingualism is not new for linguistic science. From the period when early civilizations emerged, various tribes, clans, peoples, and nations have constantly maintained relations with each other and influenced one another. Regardless of whether this influence was conscious or unconscious, various tribes and clans have split and united, large powerful ethnic communities have subjugated weak ethnic formations, and economic relations have emerged between neighboring and even distant peoples.

As a result of the mentioned processes, natural language relations also form between the peoples maintaining these relations. Thus, linguistic processes such as merging, crossing, mutual influence, and borrowing words from one another occur between their languages. In turn, these processes lead not only to individuals but also to entire ethnic communities becoming bilingual. For this reason, although bilingualism is considered an individual-mental phenomenon according to its external form and speech ability, when approached broadly, it has a deep social and ideological character according to its essence.

Bilingualism can develop to various degrees. The highest degree of bilingualism within society occurs when an individual belonging to that society uses the language they learned later as a native language in their speech rather than their native language. For example, according to the 1971 population census conducted in the USSR, 13 million people of non-Russian nationality, and according to the 1979 census, 16.3 million people of non-Russian nationality considered Russian as their native language (Allahverdiyeva & Yunusova, 2021: 109).

Two main types of bilingualism can be distinguished: regional (or local) and national. Regional bilingualism manifests itself when two or more peoples settle in a certain territory within administrative-state or geographical principles, and each of them uses mainly their specific languages in daily speech, resulting in the existence of two or more languages. This type of bilingualism is encountered in the Russian Federation, USA, People's Republic of China, Canada, India, Belgium, Indonesia, Switzerland, and many other multilingual states (Todorova, 2018).

In the national type of bilingualism, the geographical-territorial principle is not primary. This type of bilingualism is based on ethnic or national principles. In such bilingualism, the parallel existence, functioning, and development of two or more different national languages occur in one territory. In this respect, the vast majority of peoples included in the former USSR were bilingual.

Regional and national bilingualism have had many different features. Thus, regional bilingualism is monolingual in principle, both for an individual person taken separately and for the people they belong to. In national bilingualism, the complete opposite is observed, every individual and the people they belong to are bilingual. In regional bilingualism, languages live in parallel and do not mix (cross). In national bilingualism, languages not only exist side by side but also mutually influence each other, share their usage spheres, and replace each other in the speech process and experience depending on speech events (Todorova, 2018). In addition, while in regional bilingualism the spread areas of languages existing in parallel within the general region are distinguished, such cases are not encountered in national bilingualism. In this type of bilingualism, the mutual influence of languages in the same way applies to every member of society.

In the border zones of the spread areas of languages living in parallel belonging to the regional type of bilingualism, elements of national bilingualism can sometimes emerge. This arises from the constant contact of peoples speaking different languages for the purpose of mutual communication. It should be noted that in remote groups of bilingual peoples belonging to the national bilingualism type, cases of loss of the native language and complete transition to the second language are also encountered. This phenomenon is more often observed among peoples living in the former USSR territories. For example, southern and western Mansi completely switched to Russian, southwestern Nenets fully to Komi, and northeastern and northwestern Evenks completely to Yakut-Sakha (Allahverdiyeva & Yunusova, 2021: 108-109).

In the regional type of bilingualism, within a monolingual people that has become mass, not only individuals but also large groups can master two or more languages. This situation is more widespread not only in zones but also among various social groups of society, primarily intellectuals, industrial and transport workers, including mechanizers. In national bilingualism, on the contrary, cases are encountered where a people that is bilingual en masse has individuals and even large groups that are monolingual. This situation manifests itself more not only in the depth and remoteness of the language's spread areas but also among various social and age-gender groups, especially among elderly women.

Despite its relevance, regional bilingualism is encountered very rarely in linguistic literature; in many cases, this type of bilingualism remains generally unstudied.

Bilingualism and its research in the teaching process

The use of several languages during the teaching and learning process has been related to various factors. These factors include the linguistic diversity of the country or region, specific social and religious aspects, as well as national affiliation. The primary goal of the teaching process has been to impart to students the language that serves as the general communication means in the country and region and to develop high speaking and understanding skills in that language. The secondary issue of the teaching process has been teaching students the language that plays the role of an international communication means.

As a result of this, the teaching process is conducted in two or more languages. For example, in schools in Eritrea, Tigrinya, Arabic, and English are taught in parallel. Since Tigrinya is the most spoken language in the country, Arabic plays a regional communication role, and English is an international means of speech, they are taught together in Eritrean schools. As a result, students can read and speak in all three languages in daily life. Or in Papua New Guinea, there are close to 870 local languages, as a result of which the majority of the country's 3 million population uses different languages each time depending on their location and situation. In parallel with these languages, English is also taught in schools (Tucker, 1999: 1-2).

In short, the reasons for using several languages in the teaching process can be different in every state, even in every region. For example, in the mentioned Eritrea, the reason for this was the linguistic features of the region where the country is located. In contrast, in Papua New Guinea, the ethnic diversity of the country and each ethnic minority having its own specific language led to the use of various languages in the teaching process.

The use of bilingualism and a large number of languages in the teaching process is a complex and mixed issue, while at the same time playing a significant role in terms of understanding the essence of processes occurring in the context of globalization and directing these processes.

Currently, the formation of bilingualism in the teaching process has been more related to the teaching of English in states where English is not spoken. In this respect, international test systems related to determining the level of English speaking, IELTS, TOEFL, TOEIC, SAT, and others, play a special role in the formation of bilingualism among students in the teaching process (Humphreys, 2023: 17).

As a result of research conducted by the World Bank on the use of first and second languages in teaching, countries have been divided into three different categories according to bilingual population indicators: (1) those with no or very few people using the wider communication language as a native language, for example, Haiti, Nigeria, and the Philippines; (2) those with a relatively large number of people using the wider communication language as a native language, for example, Guatemala; (3) those with a large number of people using the wider communication language as a native language, for example, Canada, the USA, and New Zealand.

As a result of this research conducted by the World Bank, the following results were obtained:

- The success of the teaching process has depended on the level of the student's/pupil's cognitive and academic language knowledge. These language skills differ from the language they use at home and in daily life;

- A certain amount of time is needed for the development of cognitive and academic language. In most cases, this can take from 4 to 7 years;
- Individuals develop language and literary skills in it more easily in parallel with a language that is familiar and close to them;
- Individuals master cognitive skills and taught materials more easily when taught in a language that is familiar and close to them;
- After cognitive and academic language skills develop and the taught material is mastered, the transfer of knowledge from one language to another becomes possible;
- The main indicator of the development of cognitive and academic language skills in the second language is the level of development of those skills in the first (native) language;
- Pupils and students can learn the second language in various ways. This has depended on their cultural, intellectual, and cultural indicators (Tucker, 1999: 2).

Based on these results, the World Bank has prepared an effective teaching program for the successful use of two languages in the teaching process and has determined the main principles and tasks of teaching. These include increasing knowledge in the second language through the promotion of native language teaching, providing support by parents and families, creating a linguistic environment by the family, increasing teachers' knowledge and skills in the second language, and conducting trainings for this purpose, among others.

Linguistic environment in Azerbaijan

By linguistic situation or linguistic environment is meant the set of national (native) languages and foreign languages, the system of regional boundaries serving society, and the specificities and functionalizations of states. The linguistic environment is considered one of the main topics of sociolinguistics. In the modern period, there are two main approaches to the state of language in Azerbaijan:

- Cultural-linguistic;
- Sociolinguistic.

It should be noted that in the 20th century, the linguistic environment in Azerbaijan was determined by Azerbaijani and Russian languages. However, the languages of many ethnic groups also functioned in this environment and influenced the language situation. Currently, 26 ethnos-peoples speaking 26 languages live in Azerbaijan. To determine the role of these languages in the linguistic environment, F. Veysalli in his research work "The Language Situation in Modern Azerbaijan" shows the map of languages used by the population of Azerbaijan. Thus, 98.6% of the population speaks Azerbaijani, 7.6% Russian, 7.6% English, and ethnic minorities speak their respective languages at about 1-2%.

Bilingualism in the context of Russian and English in Azerbaijan

As one of the historically colonial states, bilingualism is observed in Azerbaijan. Throughout history, Azerbaijan has been occupied by Arabs, Persians, Russians, and other peoples, and these peoples' language systems have influenced and mixed with the Azerbaijani language. Especially the 70-year Soviet occupation period created a number of sociolinguistic problems in Azerbaijan. Thus, in 1939, the Azerbaijani language switched to the Cyrillic script. As a result, the Azerbaijani language was subjected to the strong influence of Russian.

In the Soviet period, the Azerbaijani language was also subjected to attacks at the religious level. The Soviet ideology promoting atheism tried to destroy the religious beliefs of Azerbaijanis, erase their customs and traditions from memory, and make them forget national terms, words, expressions, and other speech means that had been reflected in the Azerbaijani language for centuries (Veliyeva, 2020: 45-46).

As a result of this policy, in the Soviet period, persons of Azerbaijani origin who spoke Russian first mastered Russian and also adopted Russian culture, customs, and traditions. In most cases, such people later considered themselves "Russian." Based on this, it can be claimed that bilingualism based on Russian in Azerbaijan was artificial bilingualism (or compulsory). Because in many cases, people mastered Russian not voluntarily, but in an artificially created linguistic environment through the efforts of the Soviet leadership. Considering that Soviet rule lasted nearly 70 years in Azerbaijan, we see that the problem has taken deep roots in the country's society.

However, the collapse of the USSR and Azerbaijan's restoration of independence showed that the Azerbaijani language, despite the efforts of the occupiers, has passed all tests and preserved its linguistic features. Nevertheless, during the years of Soviet rule, Azerbaijan's linguistic environment was significantly affected. This was related both to the popularization of Russian among Azerbaijanis and to the preservation of their languages by ethnic minorities living in Azerbaijan's territory.

According to the constitution adopted in 1995, the state language of Azerbaijan is Azerbaijani (Abdullaev, 2023: 138). Although no legal status is given to other languages in the constitution, it would not be correct to conclude from this that there is no multilingual or bilingual society in Azerbaijan. Currently, many languages are used at the local-regional level in Azerbaijan. This is first related to the ethnic composition of the republic's population.

Azerbaijan is a multiethnic state. According to the 1999 census, among ethnic minorities, Lezgins constituted 2.2% of the total population, Russians 1.8%, Armenians 1.5%, Talyshs 1.0%, Avars 0.6%, Tats 0.13%, Georgians 0.2%, Kurds 0.2%, Jews 0.1%, and other peoples 0.12% (Karimova, 2017: 121). Each of these ethnic minorities spoke languages belonging to the North

Caucasian, Indo-European, Afro-Asiatic, or Kartvelian language groups. Among these languages, Russian has had greater importance according to its coverage and number of users. Although it has no de jure status, Russian has great influence in Azerbaijan. This is demonstrated by the fact that Azerbaijanis use Russian both in daily life and in the teaching process.

Russian has been the main language affecting the linguistic environment in Azerbaijan. As a result of the Soviet government's "Russification" policy, many Russian-language schools were opened and Russian sections were created in Azerbaijan. Despite the restoration of independence, Russian-language schools and sections still remain in Azerbaijan, and Russian continues to influence the country's linguistic environment.

The expansion of bilingualism among Azerbaijan's population has also been related to the Russian language. A significant part of the population can speak, write, and read in Russian along with Azerbaijani. State Statistics Committee (SSC) statistical indicators provide information about the increase in the bilingual population in Azerbaijan in recent decades. According to SSC data, 108,240 pupils studied in Russian-language schools in 2000-2001, 108,737 pupils in 2005-2006, and 108,257 pupils in 2006-2007 (Karimova, 2017: 121).

In recent years, attention to English has been increasing in Azerbaijan in parallel with Russian (Rzayeva et al., 2020: 86). In this field, the state's language strategy should be especially noted. The State Examination Center (SEC), which regulates the admission system in Azerbaijan, uses English, Russian, French, and other languages as foreign languages in test exams organized for bachelor's, master's, doctoral studies, as well as admission to state jobs. In these tests, the knowledge levels of applicants, students, and master's students in these languages are evaluated based on reading, writing, listening, and speaking indicators.

In this respect, currently in Azerbaijan, English has begun to be used more widely compared to Russian. The reasons for this can be cited as English becoming a global language and being the official language of the Internet. Thus, one of the main reasons for the spread of English in Azerbaijan has been social media tools such as Instagram, TikTok, X, Facebook, YouTube, and others, whose number of users has increased significantly in recent years and continues to increase.

It is true that according to its number of users, English in Azerbaijan still lags somewhat behind Russian. Nevertheless, the spread of English in Azerbaijan has been a greater phenomenon compared to Russian. Because while Russian was imposed on people compulsorily and artificially by the state, English, on the contrary, is learned naturally, based on people's personal interests, desires, and will. For this reason, the social base of English has been wider and deeper. Provided that this trend continues in the future, in the very near future, English-Azerbaijani bilingualism will surpass Russian-Azerbaijani bilingualism in Azerbaijan.

It should be noted that the parental factor also plays a special role in the development of bilingualism in Azerbaijan. Thus, despite English and Russian being taught in all schools, most parents also enroll their children in additional language courses. As a result, a development trend from bilingualism to multilingualism is observed in Azerbaijani society. For this very reason, determining the formation of bilingualism and multilingualism in Azerbaijani society and its causes has great importance. Bringing clarity to this issue can create an opportunity for solutions to many social and sociolinguistic issues in Azerbaijan in recent times that have not yet been resolved.

Conclusion

As we have seen, the role of bilingualism in society continues to increase in the era of globalization. Bilingualism, which creates opportunities for crossing borders as a means of communication, trade, and cultural exchange, helps individuals easily adapt to various cultural environments, understand others, be tolerant and enduring toward them, and as a result, contributes to the creation of a cooperation-based environment. Based on this, the role of bilingualism in the globalization process can be reflected in the following factors:

- Improvement of communication – as a result, intercultural relations are established and language barriers are eliminated;
- Cultural exchange – this forms feelings of respect and understanding toward each other's diversity among people. Social relations arising in such an environment are deeper and more sustainable;
- Economic opportunities – the career opportunities of bilingual people increase and expand. This gives them the opportunity to work in various cultural environments, countries, and with different people;
- Cognitive activity – bilingualism is closely related to many processes of the human brain and forms problem-solving, creativity, and cognitive diversity in individuals;
- Improvement of cognitive aging – bilingualism can temporarily stop or weaken cognitive aging in people;
- Diplomatic relations – bilingualism has also created conditions for the development of international relations. It eliminates language gaps between different peoples and thereby enables the development of international cooperation and integration.
- Promotion of peace and tolerance ideas – bilingualism teaches respect for people's differences and cultures, which constitute the main essence of globalization;
- Increasing the effectiveness of international organizations – bilingual employees and workers establish more successful relations and conduct negotiations;
- Adaptation to technological innovations – bilingualism allows people to master new technologies more easily and effectively access information on various platforms;

- Success of scientific research – scholars and researchers possessing several languages refer to a wider information base in their scientific works, analyze multilingual materials, involve different opinions and approaches in research, and achieve more successful results;
- Global communication – the increase in the number of bilingual people among people expands the social and professional network and helps create relations between subjects belonging to different languages.

Declarations

Ethics Approval and Consent to Participate

This study is based on a qualitative and analytical review of previously published literature and does not involve human participants, human data, or animal subjects. Therefore, ethical approval and informed consent were not required in accordance with institutional and international research ethics guidelines.

Consent for Publication

Not applicable. This manuscript does not contain any identifiable personal data or information requiring consent for publication.

Availability of Data and Materials

All data supporting the findings of this study are derived from publicly available academic sources cited in the reference list. No primary datasets were generated or analyzed during the current research.

Conflict of Interest Statement

The author declares that there are no competing interests—financial, institutional, or personal—that could have influenced the work reported in this paper.

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Ethical Considerations

This study adheres to internationally recognized principles of research integrity and publication ethics. The research design and analysis are grounded in established ethical frameworks, including the principles articulated by Tom L. Beauchamp and James F. Childress—namely autonomy, beneficence, non-maleficence, and justice—adapted to the context of linguistic and social research. Particular attention has been given to issues of linguistic representation, cultural sensitivity, and the responsible interpretation of sociolinguistic data.

Declaration of Artificial Intelligence (AI) use

The author acknowledges the use of artificial intelligence (Grok) in the preparation of this article. Specifically, AI was used for the following purposes only:

- Translation of the original Azerbaijani text into English;
- Editing and improving the linguistic clarity, academic style, and coherence of the English version.

The content, ideas, arguments, citations, and scientific analysis presented in this article are entirely the author's own. The author takes full responsibility for the final content of the manuscript.

Data Privacy Statement

This study does not involve the collection, processing, or storage of personal or sensitive data. All referenced materials are publicly available and used in accordance with academic and ethical standards.

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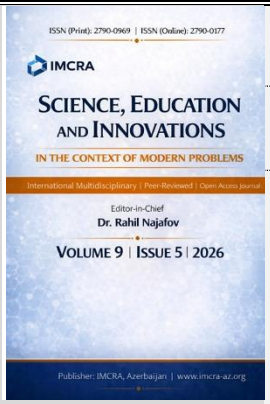
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RESEARCH ARTICLE

Reframing the Cultural Adaptation of Evidence-Based Parenting Interventions in Non-Western Contexts: A Conceptual and Empirical Analysis of the Incredible Years (IY) Program in Algeria

Abdelkrim Benmostefa

Dr .
Department of Psychology and Education, Dr. Moulay Tahar University of Saïda
Algeria
Email: Abdelkrim.benmostefa@univ-saida.dz; https://orcid.org/0009-0007-8922-8288

Keywords

Cultural adaptation; Evidence-based interventions; Parenting programs; The Incredible Years (IY); Child behavioral problems; Cognitive-behavioral therapy; Social learning theory; Algeria; Arab context; Family intervention strategies

Abstract

This study provides a comprehensive and analytically grounded examination of the feasibility of adapting the *Incredible Years (IY)* evidence-based parenting intervention within the Algerian socio-cultural context. Drawing on a systematic synthesis of empirical studies published between 2012 and 2026, the research evaluates both the cross-cultural effectiveness of the program and the structural, cultural, and institutional determinants shaping its transferability to non-Western environments. The analysis is theoretically anchored in cognitive-behavioral therapy and social learning theory, and is further informed by the ecological validity model of cultural adaptation (Bernal et al., 1995). Adopting a descriptive-analytical and integrative review approach, the study critically synthesizes evidence from international and Arabic-language literature to assess patterns of program effectiveness and contextual adaptation strategies. The findings demonstrate that the IY program consistently produces significant reductions in disruptive child behavior, with reported improvement rates ranging from 30% to 50%, alongside sustained long-term outcomes across multiple contexts. Evidence from culturally adapted implementations in Saudi Arabia, Palestine, Iran, Malaysia, and Turkey underscores the central role of cultural congruence—particularly in language, values, and social norms—in enhancing both program acceptance and intervention efficacy. Within the Algerian context, the study identifies key enabling conditions, including the presence of child protection frameworks, increasing societal awareness of mental health, and cultural proximity to other Arab settings. However, critical constraints persist, notably the dominance of authoritarian parenting practices, limited institutional capacity for professional training, insufficient expertise in evidence-based interventions, and structural financial limitations. The study advances a context-sensitive conceptual framework for cultural adaptation, emphasizing the integration of socio-cultural and religious value systems into program design. It concludes by recommending the implementation of pilot experimental studies and locally grounded validation processes to ensure both ecological validity and sustainable scalability. These findings contribute to the broader discourse on the global transferability of evidence-based interventions and highlight the necessity of culturally responsive implementation models in non-Western contexts.

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Citation

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Introduction

In recent decades, the prevalence of behavioral and emotional disorders among children and adolescents has emerged as a critical public health and social concern across both developed and developing societies. Manifestations such as aggression, defiance, hyperactivity, and impaired emotional regulation are increasingly reported, with substantial evidence linking these outcomes to maladaptive parenting practices, including inconsistency, harsh discipline, neglect, and low parental responsiveness (Loeber, 1985; Webster-Stratton, 2000; Kazdin, 2017).

Epidemiological studies estimate that the prevalence of early-onset behavioral disorders—particularly oppositional defiant disorder and conduct disorder—ranges between 7% and 25%, with significant implications for long-term psychosocial development. These early behavioral difficulties are strongly associated with adverse life trajectories, including delinquency, substance abuse, and social exclusion (Loeber, 1985; Gardner et al., 2016). In parallel, global health data indicate that approximately one in seven adolescents experiences a diagnosable mental disorder, underscoring the urgent need for early preventive and family-based interventions (World Health Organization, 2021; Patel et al., 2018).

Within the Algerian context, emerging evidence points to a concerning increase in child maltreatment and intra-family violence. National reports indicate thousands of documented cases annually, reflecting both structural and socio-cultural challenges in child protection systems (Algerian Press Service, 2021). Complementary local research further suggests that dysfunctional parenting practices are significantly associated with the development of psychological distress and behavioral disorders among children and adolescents (Lakhadhari, 2020; Ouchikh, 2019). These findings highlight the critical need for structured, evidence-based interventions targeting parenting behaviors as a primary mechanism for early prevention.

In response to these challenges, evidence-based parenting programs have gained increasing prominence as effective tools for improving parental competencies and reducing child behavioral problems. Among the most widely validated interventions is *The Incredible Years (IY)* program, developed by Webster-Stratton, which has demonstrated robust effectiveness across diverse cultural and socio-economic contexts. Grounded in cognitive-behavioral principles and social learning theory, the program focuses on strengthening positive parent–child interactions, enhancing emotional regulation, and reducing coercive family dynamics (Webster-Stratton, 2000; Leijten et al., 2019).

Despite its extensive empirical validation and global dissemination, the implementation of the IY program in non-Western regions—particularly in Arab and African contexts—remains limited. This gap raises critical questions regarding the cross-cultural transferability of evidence-based interventions and the extent to which such programs require adaptation to align with local cultural, social, and institutional realities. Accordingly, the present study seeks to address this gap by examining the feasibility, opportunities, and constraints associated with adapting the IY program within the Algerian socio-cultural context.

Theoretical Background

A substantial body of interdisciplinary research has consistently emphasized the central role of the family environment in shaping children's cognitive, emotional, and behavioral development. In particular, the quality of parent–child interactions, parental responsiveness, and disciplinary practices have been identified as key determinants of children's psychosocial adjustment (Houzel, 2003; Kazdin, 2017). Empirical findings indicate that exposure to maladaptive parenting practices—such as authoritarian control, inconsistency, and emotional neglect—is strongly associated with a range of adverse outcomes, including anxiety disorders, depression, antisocial behavior, and personality dysfunction in later life (Lakhadhari, 2020; Sylvie et al., 2010).

Similarly, research conducted in diverse cultural contexts has demonstrated that dysfunctional family dynamics, including conflict, instability, and lack of emotional support, contribute significantly to the emergence of behavioral problems such as aggression, deceit, and social withdrawal among children (Abu Leila, 2002). These findings are further supported by recent studies highlighting the negative correlation between maladaptive parenting styles and adolescents' psychosocial adjustment, with overcontrol and inconsistency identified as critical risk factors (Abriam, 2023; Baghdadi & Boutaghan, 2022).

From a theoretical perspective, these relationships can be effectively explained through the lens of social learning theory and cognitive-behavioral frameworks, which emphasize the role of observational learning, reinforcement mechanisms, and cognitive restructuring in shaping behavior (Bandura, 1977; Webster-Stratton, 2000). Within this framework, parenting interventions are conceptualized as structured processes aimed at modifying both parental behaviors and cognitive patterns in order to promote positive child development outcomes.

Among the most influential programs derived from these theoretical foundations is *The Incredible Years (IY)* intervention model. This program integrates parent training, teacher support, and child-focused components to address behavioral problems through a systemic and multi-level approach. Its effectiveness has been extensively validated through randomized controlled trials and longitudinal studies, demonstrating significant improvements in parenting practices, reductions in disruptive behavior, and enhanced emotional competence among children (Webster-Stratton, 2000; Leijten et al., 2019).

However, contemporary research increasingly recognizes that the effectiveness of such interventions is contingent upon their cultural relevance and contextual adaptability. Programs developed in Western contexts may not be directly transferable to non-Western societies without appropriate modification, as differences in cultural values, parenting norms, and institutional infrastructures may significantly influence both program acceptance and outcomes (Bernal et al., 1995; Reed et al., 2022).

In this regard, the ecological validity model proposed by Bernal et al. (1995) provides a comprehensive framework for understanding the multidimensional nature of cultural adaptation. This model emphasizes the need to consider linguistic, cultural, contextual, and value-based dimensions when adapting psychological interventions across different societies. Consequently, the present study applies this theoretical lens to critically examine the potential for adapting the IY program within the Algerian context, with particular attention to both enabling conditions and structural constraints.

Literature Review

A growing body of interdisciplinary research has consistently emphasized the central role of parenting practices in shaping children's behavioral, emotional, and psychosocial development. Early foundational work by Loeber (1985) established that maladaptive behavioral trajectories in childhood—particularly those associated with aggression and conduct disorder—are strongly linked to dysfunctional family environments. Subsequent empirical studies have reinforced this perspective, demonstrating that parenting styles characterized by inconsistency, harsh discipline, and low emotional responsiveness significantly increase the likelihood of adverse developmental outcomes (Kazdin, 2017; Lakhadhari, 2020). Recent research has further expanded this understanding by highlighting the complex relationship between parenting practices and psychosocial adjustment across different developmental stages. For instance, studies conducted in diverse socio-cultural contexts indicate that maladaptive parenting styles are negatively correlated with adolescents' emotional stability and social integration (Abriam, 2023; Baghdadi & Boutaghan, 2022). Similarly, Abu Leila (2002) demonstrated that dysfunctional intra-family dynamics, including conflict and lack of cohesion, contribute to the emergence of behavioral disorders such as aggression, deceit, and social withdrawal.

Within this framework, evidence-based parenting interventions have emerged as a critical strategy for mitigating behavioral problems and promoting positive child development. Among these, *The Incredible Years (IY)* program, developed by Webster-Stratton (2000, 2005), is widely recognized as one of the most empirically validated interventions. Grounded in social learning theory and cognitive-behavioral principles, the program focuses on modifying parental behavior through reinforcement mechanisms, modeling, and structured skill development.

A substantial body of empirical research—including randomized controlled trials and longitudinal studies—has demonstrated the effectiveness of the IY program in reducing disruptive child behavior and improving parenting practices. For example, Axberg and Broberg (2012) confirmed the successful transferability of the program from the United States to Sweden, while Helseth et al. (2016) reported sustained long-term effects on behavioral outcomes. Meta-analytical studies further support these findings, indicating that the program is particularly effective in socioeconomically disadvantaged contexts, where it contributes to both behavioral improvement and enhanced family functioning (Lijten et al., 2015; Leijten et al., 2019).

However, despite this strong empirical foundation, a growing body of literature suggests that the effectiveness of parenting interventions is not universally transferable across cultural contexts. Gardner et al. (2016) argue that the success of evidence-based programs is contingent upon their adaptability to local socio-cultural environments. Similarly, Reed et al. (2022), in a systematic review published in *The Lancet Psychiatry*, emphasize that cultural adaptation is a critical determinant of intervention outcomes, particularly in low- and middle-income countries. These findings are further supported by global mental health research, which highlights the importance of context-sensitive implementation strategies to ensure both effectiveness and sustainability (Murray et al., 2014; Patel et al., 2018). Empirical evidence from non-Western contexts provides additional support for the necessity of cultural adaptation. Studies conducted in Malaysia, Turkey, Iran, and Saudi Arabia demonstrate that modifying program components to align with local cultural values, religious norms, and social structures significantly enhances both acceptance and effectiveness (Yaacob et al., 2022; Kabadayi et al., 2025; Rahimi et al., 2025; Al-Muhesen, 2023). Similarly, Wahdan et al. (2023) highlight that culturally adapted parenting interventions can reduce parental stress and improve family functioning in contexts involving children with developmental disorders. From a theoretical perspective, these findings are best understood through the ecological validity model proposed by Bernal et al. (1995), which conceptualizes cultural adaptation as a multidimensional process encompassing language, values, context, and delivery mechanisms. This model has been widely adopted in cross-cultural intervention research and provides a robust framework for analyzing the transferability of psychological programs across diverse settings.

Despite these advancements, a critical gap remains in the literature regarding the application of evidence-based parenting interventions in North African contexts, particularly in Algeria. Existing studies have largely focused on Western and selected Middle Eastern settings, leaving the Maghreb region underrepresented in empirical research. Moreover, local studies in Algeria have primarily examined the negative effects of parenting practices rather than the implementation and evaluation of structured intervention programs (Ouchikh, 2019; Lakhadhari, 2020).

In addition, structural challenges—including limited institutional capacity, insufficient professional training, and socio-cultural resistance to non-traditional parenting approaches—may further constrain the adoption of evidence-based interventions in the region. These constraints highlight the need for a contextually grounded analytical framework that not only assesses program effectiveness but also identifies pathways for culturally sensitive adaptation and implementation.

Accordingly, the present study contributes to the existing literature by addressing this gap through a systematic and theoretically informed analysis of the feasibility of adapting the IY program within the Algerian socio-cultural context. By integrating empirical evidence, theoretical frameworks, and contextual analysis, the study aims to advance the understanding of how evidence-based parenting interventions can be effectively transferred and localized in non-Western environments.

The Incredible Years (IY) Program

The Incredible Years (IY) program is widely recognized as one of the most empirically validated and globally implemented parenting interventions designed to prevent and treat behavioral problems in children. Developed by Carolyn Webster-Stratton, the program is grounded in the principles of social learning theory and cognitive-behavioral frameworks, emphasizing the role of reinforcement, modeling, and parent–child interaction patterns in shaping child behavior (Webster-Stratton, 2000; 2005). The IY intervention adopts a multi-component and systemic approach, comprising three interrelated modules: (i) parent training, (ii) teacher training, and (iii) child-focused intervention. This integrated structure allows the program to address behavioral problems across multiple ecological levels, thereby enhancing its effectiveness and sustainability. The core objectives of the program include strengthening positive parent–child relationships, improving family communication patterns, reducing coercive and disruptive behaviors, and promoting children's social and emotional competencies.

In practice, the program is typically delivered through structured group-based sessions over a period of approximately 12–16 weeks, incorporating interactive techniques such as role-playing, video modeling, and guided practice. These methods are designed to facilitate behavioral change through experiential learning and peer support, which have been shown to be more effective than purely didactic approaches in parenting interventions (Letarte et al., 2010).

Empirical Evidence and Cross-Cultural Applications. A substantial body of international research—including randomized controlled trials, longitudinal studies, and meta-analyses—has consistently demonstrated the effectiveness of the IY program in reducing child behavioral problems and improving parenting practices. For example, longitudinal evidence from Norway indicates that the program produces sustained reductions in aggressive behavior, with effects persisting for up to four years post-intervention (Helseth et al., 2016). Similarly, meta-analytic findings suggest that the program is particularly effective among socioeconomically disadvantaged populations, where it contributes to both behavioral improvement and enhanced family functioning (Lijten et al., 2015; Leijten et al., 2019).

Evidence from European contexts further supports the program's transferability across institutional settings. Studies conducted in Sweden demonstrate significant reductions in oppositional and disruptive behaviors among children, confirming the program's applicability beyond its original U.S. context (Axberg & Broberg, 2012). However, while these findings highlight strong internal validity, they also raise important questions regarding the external validity and cultural transferability of the intervention in non-Western societies.

Recent research increasingly emphasizes that the effectiveness of parenting interventions is contingent upon their cultural adaptation. Empirical studies conducted in Malaysia, Turkey, Iran, and Saudi Arabia demonstrate that aligning program content with local cultural values, religious norms, and social practices significantly enhances both acceptance and effectiveness (Yaacob et al., 2022; Kabadayi et al., 2025; Rahimi et al., 2025; Al-Muhesen, 2023). Similarly, research in Palestine indicates that culturally adapted versions of the program not only reduce child behavioral problems but also improve parental psychological well-being, particularly in high-stress contexts such as families with children with autism spectrum disorder (Wahdan et al., 2023).

Despite these promising findings, the geographical distribution of empirical research remains uneven. While considerable evidence exists for Western and selected Middle Eastern contexts, studies examining the implementation of the IY program in North African settings—particularly within the Maghreb region—are notably scarce. This gap highlights the need for context-specific research that accounts for cultural norms, institutional capacities, and socio-economic constraints.

Research Problem

Despite the robust empirical evidence supporting the effectiveness of the IY program, its implementation in Arab and African contexts remains limited. Existing literature suggests that the success of evidence-based interventions is not solely determined by their theoretical robustness, but also by their compatibility with the cultural, social, and institutional characteristics of the target population (Bernal et al., 1995; Reed et al., 2022).

In the Algerian context, where traditional parenting norms, institutional limitations, and resource constraints may influence program implementation, the direct transfer of Western-developed interventions may be insufficient without systematic cultural adaptation. Accordingly, a critical research gap exists in understanding how such programs can be effectively localized and implemented within this socio-cultural environment.

Research Questions

In light of these considerations, the present study is guided by the following research questions:

- To what extent does the IY program demonstrate effectiveness in reducing behavioral problems among children across different cultural contexts?
- What are the key experiences and outcomes of adapting the program in Arab and Islamic societies?
- What structural and contextual opportunities support the implementation of the program in Algeria?
- What socio-cultural and institutional barriers may hinder the adaptation process?
- What culturally responsive mechanisms can be developed to adapt the program in accordance with the ecological validity model?

Research Objectives

This study aims to:

- critically evaluate the effectiveness of the IY program based on recent empirical evidence;
- synthesize existing experiences of cultural adaptation in non-Western contexts;
- identify structural opportunities for program implementation in Algeria;
- analyze key barriers to effective adaptation and scalability;
- develop a preliminary conceptual framework for culturally responsive adaptation of the program.

Methodology

The study adopts a descriptive-analytical and integrative review approach, based on a systematic analysis of empirical research published between 2012 and 2026. The selected studies include randomized controlled trials, quasi-experimental designs, and applied research examining the implementation of the IY program across diverse cultural contexts.

The analytical framework is guided by the ecological validity model of cultural adaptation proposed by Bernal et al. (1995), which conceptualizes adaptation as a multidimensional process encompassing linguistic, cultural, contextual, and structural dimensions. This framework enables a critical assessment of both the effectiveness and transferability of the program, with particular attention to its applicability within the Algerian socio-cultural environment.

Interpretation and Discussion of Previous Studies on *The Incredible Years (IY)* Program :

Study	Context and Sample	Methodology	Key Findings	ScientificInterpretation
Helseth et al. 2016	Norway – Families with children exhibiting behavioral problems	RandomizedControlled Trial (RCT)	Reduction in aggressive behaviors; improvement in parenting skills; effects sustained for 4 years	These findings suggest that *The Incredible Years (IY)* program is grounded in behavior modification strategies based on positive reinforcement and observational learning, derived from social learning theory. This explains the long-term sustainability of its effects (Webster-Stratton, 2000, 2005, 2014). The results also support theeffectiveness of long-term parenting interventions in preventing behavioral problems in

				children.
Lijten et al. 2015	Netherlands – 154 families from low socioeconomic backgrounds	Quasi-experimentalstudy	Reduction in disruptive behaviors; improved family interaction	These results reflect the program's effectiveness even in disadvantaged social contexts, supporting the assumption that improving parenting skills can mitigate the impact of socioeconomic risk factors on child development. (Lijten et al. 2015)
Axberg&Broberg 2012	Sweden – 62 children diagnosed with oppositional defiant disorder	Experimentalstudy (two groups)	Significant improvement in disruptive behaviors; sustained improvement after one year	These findings indicate that the program is not only preventive but also therapeutic, particularly for children with diagnosed behavioral disorders, aligning with existing literature on the effectiveness of parent training interventions. (Webster-Stratton, 2000)
Yaacob et al. 2022	Malaysia – Families from Asian cultural backgrounds	Applied study following cultural adaptation	Improved parent–child relationships; reduction in disruptive behaviors	This study highlights the importance of cultural adaptation of psychological programs, as certain components of the program were modified to align with local cultural values, which led to increased acceptance of the program by families and enhanced its effectiveness. This finding confirms what was proposed by (Bernal et al, 1995) regarding the necessity of taking cultural specificities into account when transferring therapeutic programs across different societies.
Rahimi et al. 2025	Iran – Families of children with ADHD	RandomizedControlled Trial (RCT)	Significant improvement in parenting skills; reduction in ADHD symptoms ($p < 0.01$)	These findings suggest that the program can effectively address attention-deficit/hyperactivity disorder by training parents in positive discipline and reinforcement strategies, thereby improving behavioral regulation.
Kabadayi et al. 2025	Turkey – Families with preschool children	Experimental study following cultural adaptation	Improvement in positive parenting skills; reduction in aggressive behavior	These results support the hypothesis that the success of interventions in non-Western societies depends on their alignment with cultural and religious values, as reflected in the program's effectiveness after cultural adaptation.
Wahdan et al.	Palestine –	Appliedstudy	Reduction in	These findings demonstrate that the

2023	Parents of children with autism spectrum disorder		parental stress; improved family interaction	program not only addresses children's behavioral issues but also enhances parental mental health by providing social support and coping strategies.
Al-Muhesen 2023	Saudi Arabia – Muslim Arab families	Applied study following cultural adaptation	Increased use of positive parenting practices; improved family relationships	This study emphasizes the importance of integrating religious values into psychological interventions in Islamic contexts, which enhances program acceptance and effectiveness.
Reed et al. 2022	Low- and middle-income countries	Systematicreview	60% of unsuccessful programs were due to inadequate training and supervision	These findings indicate that the success of parenting programs depends not only on program design but also on the availability of well-trained facilitators and supportive institutional infrastructure.

Interpretation of Findings

The findings derived from previous studies provide a set of significant insights that help explain the effectiveness of *The Incredible Years (IY)* program across diverse cultural contexts.

First, the majority of studies consistently indicate that the program demonstrates high effectiveness in reducing behavioral problems among children. This effectiveness can be attributed to its strong theoretical foundation in cognitive-behavioral therapy and social learning theory, which emphasize the role of reinforcement and modeling in behavior modification (Webster-Stratton, 2000).

Second, the success of the program in non-Western societies appears to be closely linked to the process of cultural adaptation. Modifying program content to align with the cultural and religious values of the target population has been shown to enhance both family acceptance and intervention outcomes (Bernal et al., 1995; Yaacob et al., 2022; Al-Muhesen, 2023). This finding underscores the importance of contextual sensitivity when implementing psychological interventions across different cultural settings.

Third, the impact of the program extends beyond children to include improvements in parental mental health. Several studies have reported reductions in parental stress and enhanced psychological well-being, which, in turn, contribute to a more positive family climate and improved parent–child interactions (Wahdan et al., 2023).

Finally, the quality of professional training and supervision emerges as a critical determinant of program effectiveness. Evidence suggests that inadequate training and supervision can significantly undermine intervention outcomes, highlighting the need for well-structured implementation frameworks and qualified facilitators (Reed et al., 2022).

Cultural Adaptation of *The Incredible Years (IY)* Program in Algeria According to Bernal's Model :

Cultural Adaptation Dimension	Description in Bernal's Model	Proposed Adaptation in the Algerian Context	ScientificInterpretation
Language	Use of language that is understandable and familiar to participants	Translation of the program into Arabic, simplification of psychological terminology, and the use of colloquial expressions when necessary	Linguistic adaptation enhances participants' comprehension and increases family acceptance, particularly in contexts where the original program language differs (Bernal et al, 1995).

Persons	Consideration of the cultural characteristics of program facilitators	Training Algerian psychologists to deliver the program, with the involvement of family counselors and social workers	Cultural congruence between facilitators and participants contributes to building trust and enhances the effectiveness of psychological interventions (Reed et al, 2022).
Metaphors	Use of culturally relevant examples and metaphors	Incorporating examples from everyday Algerian family life, such as extended family relationships and respect for elders	The use of culturally grounded metaphors facilitates the understanding and application of psychological concepts in daily life (Bernal et al, 1995).
Content	Integration of cultural elements and social values into the program	Integrating Islamic values such as compassion, patience, and kindness in parenting practices	Incorporating religious and cultural values increases the acceptability and effectiveness of psychological programs in Arab and Islamic societies (Al-Muhesen, 2023).
Concepts	Alignment of psychological concepts with cultural values	Reframing the concept of "positive discipline" to align with Algerian cultural norms, which may lean toward more authoritarian parenting styles	Adapting concepts to fit cultural values reduces resistance and enhances engagement with intervention programs (Yaacob et al, 2022).
Goals	Alignment of program objectives with societal values	Emphasizing family cohesion, respect for parents, and the development of positive parenting skills	Linking program goals to prevailing social values increases participants' motivation and engagement.
Methods	Use of culturally appropriate teaching strategies	Utilizing group discussions, role-playing, and video materials reflecting Algerian social contexts	Interactive and practice-based training methods are more effective than purely theoretical approaches in developing parenting skills (Webster-Stratton, 2000).
Context	Consideration of social and economic conditions	Implementing the program in schools, child protection centers, and local community organizations	The success of psychological programs depends on the availability of supportive institutional infrastructures (Reed et al, 2022).

Discussion of Table 2 Findings

The findings presented in Table 2 indicate that the cultural adaptation of *The Incredible Years (IY)* parenting program within the Algerian context extends beyond mere linguistic translation to encompass a multidimensional process involving language, values, practices, and the broader social context. This perspective is consistent with the theoretical framework of Bernal's model, which emphasizes that the effectiveness of psychological interventions is contingent upon their alignment with the cultural characteristics of the target population.

The results further corroborate the assumptions of the Bernal Model of Cultural Adaptation, which posits that the success of psychological interventions is closely linked to the degree of their cultural adaptation. In particular, linguistic adaptation was found to enhance participants' comprehension, in line with the findings of (Bernal et al, 1995), who highlighted the central role of language in conveying culturally embedded meanings. Moreover, the results support the conclusions of (Reed et al, 2022), which underscore that cultural congruence between facilitators and participants fosters trust and improves intervention outcomes.

In addition, the integration of religious values into the program is consistent with the findings of (Al-Muhesen, 2023), which demonstrated that incorporating the religious dimension enhances the acceptability of psychological programs in Arab societies. Likewise, the results concerning the use of interactive training methods align with the work of (Webster-Stratton,

2000, 2005, 2014), which emphasized the superiority of interactive learning approaches over didactic instruction in promoting behavioral change.

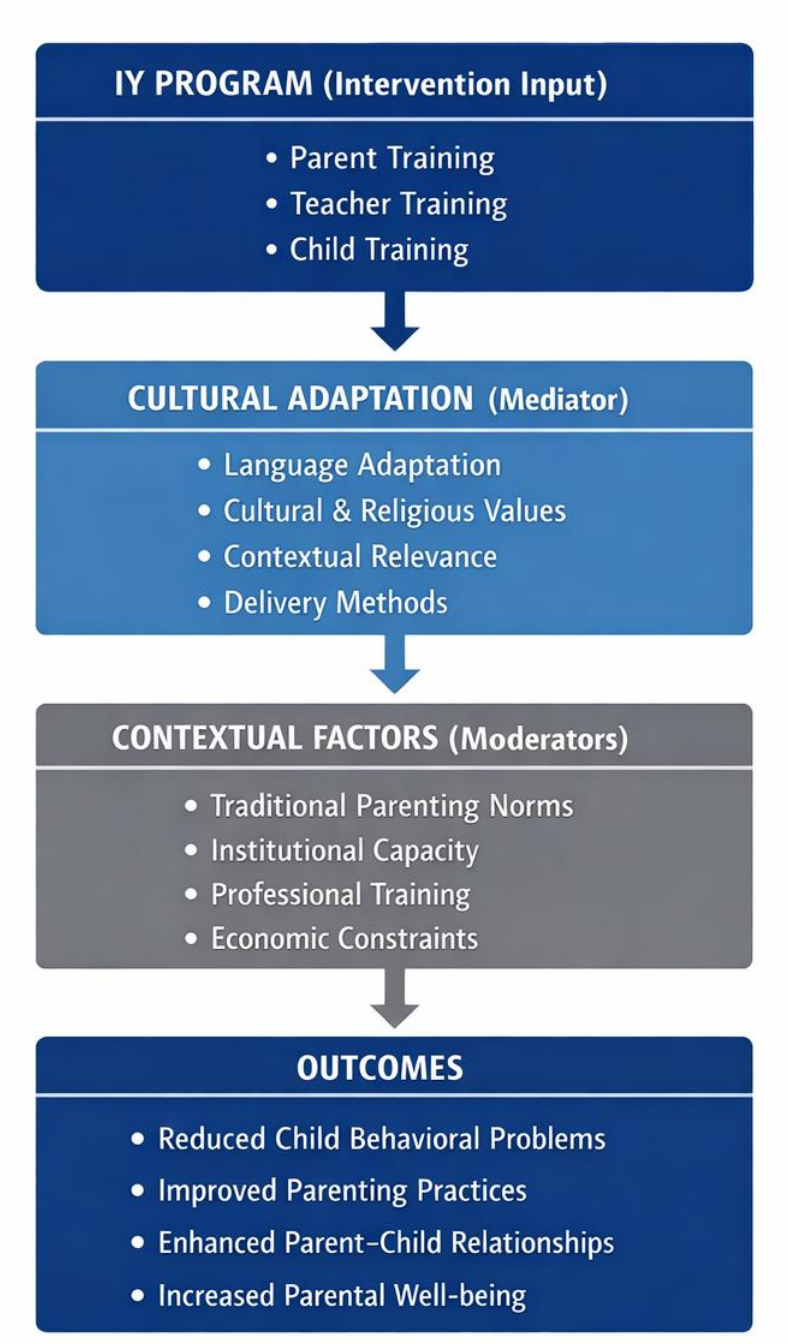

Figure 1. Conceptual framework illustrating the cultural adaptation and implementation process of the Incredible Years (IY) program in the Algerian context.

General Discussion

The findings of the reviewed studies indicate that *The Incredible Years (IY)* program is among the most effective parenting interventions globally. This effectiveness can be attributed to its strong theoretical foundations in social learning theory and cognitive-behavioral therapy (Webster-Stratton, 2000).

Furthermore, the evidence suggests that the success of the program in non-Western societies is largely dependent on the extent of its cultural adaptation. This conclusion is supported by studies conducted in Malaysia, Turkey, and Iran (Yaacob et al., 2022; Kabadayi et al., 2025; Rahimi et al., 2025), which demonstrated that culturally adapted versions of the program yield more favorable outcomes.

Within the Algerian context, insights drawn from Arab experiences may provide a valuable foundation for adapting the program in a manner that aligns with Islamic values and local cultural norms. Such alignment is likely to enhance family acceptance and engagement with the program.

However, the implementation of the program may face several challenges, including the prevalence of traditional parenting practices characterized by authority and physical punishment, as well as limited training resources and a shortage of specialists in evidence-based interventions.

Nevertheless, the growing interest in mental health and the presence of institutions dedicated to child protection represent significant opportunities for the successful implementation of the program in Algeria.

Conceptual Framework and Empirical Evidence

This study proposes an integrative conceptual framework to explain the cultural adaptation and effectiveness of the *Incredible Years (IY)* parenting program within the Algerian socio-cultural context. The framework is grounded in three complementary theoretical perspectives: social learning theory, cognitive-behavioral theory, and the ecological validity model of cultural adaptation proposed by Bernal et al. (1995).

According to social learning theory, children's behavior is shaped through observational learning, reinforcement, and modeling processes within the family environment. Cognitive-behavioral theory further emphasizes the role of parental cognitions, beliefs, and interaction patterns in influencing children's behavioral and emotional outcomes. These theoretical foundations are extended by the ecological validity model, which conceptualizes cultural adaptation as a multidimensional process involving language, values, context, and delivery mechanisms.

Building on these perspectives, the proposed framework conceptualizes the IY program as a structured intervention input that influences child behavioral outcomes through a set of mediating and moderating variables. The primary mediating mechanism is cultural adaptation, which includes linguistic adaptation, integration of cultural and religious values, contextual relevance of program content, and the use of culturally appropriate teaching methods. These factors determine the degree to which the program is accepted and effectively implemented within the target population.

At the same time, the relationship between the intervention and its outcomes is influenced by several contextual moderating variables, including traditional parenting norms, institutional capacity, availability of trained professionals, and economic constraints. These factors may either facilitate or hinder the successful implementation of the program in the Algerian context.

The expected outcomes of the framework include a reduction in children's behavioral problems, improvement in parenting practices, strengthening of parent–child relationships, and enhancement of parental psychological well-being. Accordingly, the effectiveness of the IY program is conceptualized as a function of the interaction between intervention design, cultural adaptation processes, and contextual conditions.

Empirical evidence strongly supports this conceptualization. A substantial body of international research demonstrates that the IY program consistently produces significant reductions in disruptive child behavior, with improvement rates ranging between 30% and 50%, and long-term effects sustained for several years following intervention. For example, Helseth et al. (2016) reported long-term behavioral improvements in Norway, while Axberg and Broberg (2012) confirmed the program's effectiveness in clinical populations in Sweden. Similarly, Lijten et al. (2015) demonstrated that the program remains effective even in socioeconomically disadvantaged contexts.

However, cross-cultural studies indicate that program effectiveness is not uniform across different societies. Research conducted in Malaysia, Turkey, Iran, and Saudi Arabia shows that culturally adapted versions of the program yield significantly better outcomes compared to non-adapted implementations (Yaacob et al., 2022; Kabadayi et al., 2025; Rahimi et al., 2025; Al-Muhesen, 2023). These findings highlight the critical importance of aligning intervention content with local cultural values, religious norms, and social practices.

Furthermore, evidence from Palestine (Wahdan et al., 2023) indicates that the program also contributes to reducing parental stress and improving overall family functioning, suggesting that its impact extends beyond child behavior to broader psychosocial outcomes. Conversely, systematic reviews (Reed et al., 2022) indicate that a significant proportion of unsuccessful intervention programs in low- and middle-income countries are associated with inadequate training, weak supervision, and insufficient institutional support.

Taken together, these findings confirm that the effectiveness of the IY program is contingent upon a combination of theoretical robustness, cultural adaptation, and contextual readiness. Despite strong global evidence, the application of such interventions in North African contexts—particularly in Algeria—remains limited, highlighting a critical gap in the literature.

Accordingly, this study contributes to the existing body of knowledge by integrating theoretical models and empirical evidence to develop a context-sensitive framework for the cultural adaptation of parenting interventions. This framework provides a foundation for future empirical research, including pilot studies and randomized controlled trials, aimed at validating the effectiveness of the IY program within the Algerian socio-cultural environment.

Conclusion

The findings of the present study provide strong evidence that *The Incredible Years (IY)* program constitutes a robust and effective evidence-based intervention for enhancing parenting practices and reducing disruptive behavioral problems among children. The synthesis of international empirical studies demonstrates not only the program's internal validity across diverse populations, but also its capacity for sustained long-term impact on both child behavior and family functioning.

Importantly, the analysis highlights that the effectiveness of the IY program is not universally transferable in a direct manner; rather, it is contingent upon the degree of cultural alignment and contextual adaptation. Evidence from non-Western settings consistently indicates that culturally adapted implementations yield significantly improved outcomes compared to standardized program delivery. This underscores the critical role of integrating socio-cultural values, linguistic considerations, and local parenting norms into intervention design.

Within the Algerian context, the study identifies both enabling conditions and structural constraints that shape the feasibility of program implementation. While increasing awareness of child mental health and the presence of institutional support structures create favorable conditions, challenges related to traditional parenting practices, limited professional training capacity, and resource constraints remain significant barriers. These findings suggest that successful implementation requires a carefully designed, context-sensitive adaptation strategy rather than direct program transfer.

Accordingly, this study advances a conceptual and analytical foundation for the cultural adaptation of evidence-based parenting interventions in Algeria. It recommends the development of pilot implementation projects and rigorously

designed empirical studies—particularly randomized controlled trials—to evaluate program effectiveness under local conditions. Such research is essential to ensure ecological validity, optimize intervention outcomes, and support evidence-informed policy development.

Overall, the study contributes to the growing body of literature on the global transferability of evidence-based interventions by demonstrating that program success is fundamentally dependent on the interaction between theoretical rigor, cultural adaptation, and contextual readiness. These insights provide a strategic framework for future research and practical implementation in Algeria and comparable non-Western settings.

Declarations.

Ethical Considerations

This study was conducted in full compliance with internationally recognized ethical standards for research in the social and behavioral sciences. As the research is based exclusively on a systematic review and critical analysis of previously published studies, no direct involvement of human participants or animals was required. All sources have been appropriately cited, and intellectual property rights have been strictly respected. The study adheres to the ethical principles outlined by the World Health Organization and aligns with the publication ethics guidelines of the Committee on Publication Ethics (COPE).

Conflict of Interest

The author declares that there are no financial, personal, or professional conflicts of interest that could have influenced the research, analysis, or interpretation of the findings presented in this study.

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Author Contributions

The author confirms sole responsibility for all aspects of this research, including conceptualization, literature review, analysis, interpretation of findings, and manuscript preparation.

Data Availability Statement

The data supporting the findings of this study are derived from publicly available published literature. All relevant sources are cited within the article. No new datasets were generated or analyzed during the current study.

Informed Consent Statement

Not applicable. This study does not involve human participants, personal data collection, or experimental procedures requiring informed consent.

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AI Use Statement

The author declares that artificial intelligence (AI) tools were not used to generate the scientific content, data analysis, or core interpretations of this study. Any language refinement, if applied, did not affect the originality, academic integrity, or intellectual contribution of the work.

Consent for Publication

Not applicable. The manuscript does not contain any individual person's data in any form.

Research Transparency Statement

The author affirms that this study has been conducted with transparency, rigor, and academic integrity. All sources have been appropriately acknowledged, and no form of plagiarism, data fabrication, or falsification has occurred.

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GUIDELINES FOR AUTHORS

A standardized article template is available to assist authors in preparing manuscripts in accordance with the journal's formatting, ethical, and submission requirements.

The journal provides a comprehensive framework for manuscript preparation, submission, and publication in line with international academic standards. Authors are strongly encouraged to follow the guidelines below to ensure clarity, consistency, and an efficient peer review process.

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1. Scope and General Requirements

The journal is an international, peer-reviewed, multidisciplinary platform publishing high-quality research in social sciences, education, economics, law, and interdisciplinary studies addressing contemporary global challenges.

Manuscripts must meet the following criteria:

- The work must be original and not under consideration elsewhere
- The study must demonstrate clear academic contribution and methodological rigor
- The content must align with the journal's scope and international scholarly standards

Authors are responsible for ensuring full compliance with editorial and ethical requirements.

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2. Manuscript Preparation

Length of the Manuscript

Manuscripts should typically be between **6,000 and 10,000 words**, including references.

Longer manuscripts (up to 12,000–15,000 words) may be considered in exceptional cases.

2.1 Structure of the Manuscript

Title

The title should be concise, precise, and informative.

Author Information

Authors must provide:

- Full names
- Institutional affiliations (department, university, country)
- Corresponding author's email

ORCID is recommended for transparency and indexing.

Abstract (150–350 words)

The abstract must include:

- Background
- Objectives
- Methodology
- Key findings
- Conclusions

Keywords

Provide **4–6 keywords** in English relevant to the topic and suitable for indexing.

2.2 Main Text (IMRaD Structure)

Manuscripts should follow a standard academic structure:

- Introduction
- Literature Review
- Methodology
- Results / Findings
- Discussion
- Conclusion

Additional sections (Acknowledgements, Funding, Declarations) should be included where applicable.

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3. Formatting Requirements

- Page size: A4

- Font: Times New Roman, 12 pt
- Line spacing: 1.5
- Margins: 2 cm
- Alignment: Justified

Manuscripts must not include page numbers, headers, or footers.

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4. Tables and Figures

- Number consecutively (Table 1, Figure 1, etc.)
- Provide clear captions
- Cite in the text

Tables: must be editable
Figures: minimum resolution 300 DPI

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5. Ethical Principles

The journal follows international standards of publication ethics and academic integrity.
Authors must ensure:

- Originality and proper citation
- No plagiarism or data manipulation
- Disclosure of conflicts of interest
- Approval of all co-authors

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6. Peer Review Process

All manuscripts undergo **double-blind peer review**.
Evaluation criteria include:

- Scientific contribution
- Methodological quality
- Clarity and structure
- Relevance to scope

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7. References (APA 7th Edition)

In-text citations:

- One author: (Smith, 2023)
- Two authors: (Smith & Johnson, 2022)
- Three or more: (Smith et al., 2021)

Reference list:

- Alphabetical order
- Complete bibliographic information
- DOI where available

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8. Supplementary Materials

Additional materials (datasets, appendices) may be submitted and must be clearly referenced.

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9. Permissions

Authors must obtain permission for any copyrighted material used.

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10. Submission Process

Manuscripts must be submitted via the journal's official system.
Required file:

- Manuscript (DOCX format)

All submissions must be complete, properly formatted, and proofread.

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11. Declarations

Authors must include:

- Acknowledgements
- Funding Statement

- Conflict of Interest
- Author Contributions
- Ethical Statement (if applicable)
- AI Use Statement

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12. Final Checklist Before Submission
Authors should:

- Verify structure and formatting
- Ensure ethical compliance
- Conduct plagiarism checks
- Include classification codes where applicable

Contact
For inquiries regarding submission and formatting:
Email: editor@imcra-az.org

Editor-in-Chief
Rahil Najafov, Dr. — International Meetings and Conferences Research Association (IMCRA), Baku, Azerbaijan
Email: editor@imcra-az.org

Editorial Administration
A. Najafova — International Meetings and Conferences Research Association (IMCRA), Baku, Azerbaijan
Email: contact@imcra-az.org

Technical Support
A. Mustafazadah — International Meetings and Conferences Research Association (IMCRA), Baku, Azerbaijan
Email: imcraaz@gmail.com

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Contact and Submissions

International Meetings and Conferences Research Association
Baku, Azerbaijan

editor@imcra-az.org
General Inquiries: *editor@imcra-az.org*

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